

16-3036-101
December 15, 1988



Service Manual

Programmed Chip Summary

(Continued from Inside-Front Cover)

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
Image ROM	ROM	27512	ROM Board U55	A-5343-3036-43
Image ROM	ROM	27512	ROM Board U56	A-5343-3036-44
Image ROM	ROM	27512	ROM Board U57	A-5343-3036-45
Image ROM	ROM	27512	ROM Board U58	A-5343-3036-46
Program ROM	ROM	27512	ROM Board U59	A-5343-3036-11
Program ROM	ROM	27512	ROM Board U60	A-5343-3036-12
Image ROM	ROM	27512	ROM Board U61	A-5343-3036-47
Image ROM	ROM	27512	ROM Board U62	A-5343-3036-48
Image ROM	ROM	27512	ROM Board U63	A-5343-3036-49
Image ROM	ROM	27512	ROM Board U64	A-5343-3036-50
Image ROM	ROM	27512	ROM Board U65	A-5343-3036-51
Image ROM	ROM	27512	ROM Board U66	A-5343-3036-52
Image ROM	ROM	27512	ROM Board U67	A-5343-3036-53
Image ROM	ROM	27512	ROM Board U68	A-5343-3036-54
Image ROM	ROM	27512	ROM Board U69	A-5343-3036-55
Image ROM	ROM	27512	ROM Board U70	A-5343-3036-56
Image ROM	ROM	27512	ROM Board U71	A-5343-3036-57
Image ROM	ROM	27512	ROM Board U72	A-5343-3036-58
Image ROM	ROM	27512	ROM Board U73	A-5343-3036-59
Image ROM	ROM	27512	ROM Board U74	A-5343-3036-60
Image ROM	ROM	27512	ROM Board U75	A-5343-3036-61
Image ROM	ROM	27512	ROM Board U76	A-5343-3036-62
Program ROM	ROM	27512	ROM Board U77	A-5343-3036-13
Program ROM	ROM	27512	ROM Board U78	A-5343-3036-14
Image ROM	ROM	27512	ROM Board U79	A-5343-3036-63
Image ROM	ROM	27512	ROM Board U80	A-5343-3036-64
Image ROM	ROM	27512	ROM Board U81	A-5343-3036-65
Image ROM	ROM	27512	ROM Board U82	A-5343-3036-66
Image ROM	ROM	27512	ROM Board U83	A-5343-3036-67
Image ROM	ROM	27512	ROM Board U84	A-5343-3036-68
Image ROM	ROM	27512	ROM Board U85	A-5343-3036-69
Image ROM	ROM	27512	ROM Board U86	A-5343-3036-70
Image ROM	ROM	27512	ROM Board U87	A-5343-3036-71
Image ROM	ROM	27512	ROM Board U88	A-5343-3036-72
Image ROM	ROM	27512	ROM Board U89	A-5343-3036-73
Image ROM	ROM	27512	ROM Board U90	A-5343-3036-74
Image ROM	ROM	27512	ROM Board U91	A-5343-3036-75
Image ROM	ROM	27512	ROM Board U92	A-5343-3036-76
Image ROM	ROM	27512	ROM Board U93	A-5343-3036-77
Image ROM	ROM	27512	ROM Board U94	A-5343-3036-78

NARC

Service Manual

Programmed Chip Summary

(Continued on Inside-Back Cover)

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
CRAM Controller	PLD	EP153A	CPU Board U28	A-5346-3036-1
Local Ctlr	PLD	EP153A	CPU Board U78	A-5346-3036-2
Video RAM Ctlr	PLD	EP153A	CPU Board U79	A-5346-3036-3
Address Decoder	PLD	EP153A	CPU Board U80	A-5346-3036-4
Image ROM Ctlr	PLD	EP153A	CPU Board U83	A-5346-3036-5
Video RAM Seq.	PLD	EP600	CPU Board U12	A-5346-3036-6
Autoerase Ctlr	PLD	EP900	CPU Board U20	A-5346-3036-7
Program ROM	ROM	27512	ROM Board U23	A-5343-3036-7
Program ROM	ROM	27512	ROM Board U24	A-5343-3036-8
Image ROM	ROM	27512	ROM Board U25	A-5343-3036-15
Image ROM	ROM	27512	ROM Board U26	A-5343-3036-16
Image ROM	ROM	27512	ROM Board U27	A-5343-3036-17
Image ROM	ROM	27512	ROM Board U28	A-5343-3036-18
Image ROM	ROM	27512	ROM Board U29	A-5343-3036-19
Image ROM	ROM	27512	ROM Board U30	A-5343-3036-20
Image ROM	ROM	27512	ROM Board U31	A-5343-3036-21
Image ROM	ROM	27512	ROM Board U32	A-5343-3036-22
Image ROM	ROM	27512	ROM Board U33	A-5343-3036-23
Image ROM	ROM	27512	ROM Board U34	A-5343-3036-24
Image ROM	ROM	27512	ROM Board U35	A-5343-3036-25
Image ROM	ROM	27512	ROM Board U36	A-5343-3036-26
Image ROM	ROM	27512	ROM Board U37	A-5343-3036-27
Image ROM	ROM	27512	ROM Board U38	A-5343-3036-28
Image ROM	ROM	27512	ROM Board U39	A-5343-3036-29
Image ROM	ROM	27512	ROM Board U40	A-5343-3036-30
Program ROM	ROM	27512	ROM Board U41	A-5343-3036-9
Program ROM	ROM	27512	ROM Board U42	A-5343-3036-10
Image ROM	ROM	27512	ROM Board U43	A-5343-3036-31
Image ROM	ROM	27512	ROM Board U44	A-5343-3036-32
Image ROM	ROM	27512	ROM Board U45	A-5343-3036-33
Image ROM	ROM	27512	ROM Board U46	A-5343-3036-34
Image ROM	ROM	27512	ROM Board U47	A-5343-3036-35
Image ROM	ROM	27512	ROM Board U48	A-5343-3036-36
Image ROM	ROM	27512	ROM Board U49	A-5343-3036-37
Image ROM	ROM	27512	ROM Board U50	A-5343-3036-38
Image ROM	ROM	27512	ROM Board U51	A-5343-3036-39
Image ROM	ROM	27512	ROM Board U52	A-5343-3036-40
Image ROM	ROM	27512	ROM Board U53	A-5343-3036-41
Image ROM	ROM	27512	ROM Board U54	A-5343-3036-42

ANALOG



SERVICE MANUAL

- operation
- adjustment
- unique parts
- bookkeeping
- diagnostics

NARC and Z-UNIT are trademarks of WILLIAMS ELECTRONICS GAMES, INC.

Programmed Chips on the Sound Board

IC	DESCRIPTION	TYPE	BOARD LOC.	PART NO.
Sound ROM	ROM	27512	Sound Board U3	Not Used
Sound ROM	ROM	27512	Sound Board U4	A-5343-3036-1
Sound ROM	ROM	27512	Sound Board U5	A-5343-3036-2
Sound ROM	ROM	27512	Sound Board U35	A-5343-3036-3
Sound ROM	ROM	27512	Sound Board U36	A-5343-3036-4
Sound ROM	ROM	27512	Sound Board U37	A-5343-3036-5
Sound ROM	ROM	27512	Sound Board U38	A-5343-3036-6



Jumper Table

CPU Board	Connected	Not Used
	W3	W1
	W4	W2
	W6	W5
	W9	W7
	W10	W8
	W11	W12
ROM Board	W14	W13
	1 / 2	(None)
	3 / 4	
	5 / 6	
	7 / 8	
	9 / 10	
	11 / 12	
CPU Board	13 / 14	
	R1	
	W3	W1
	W4	W2
	W6	W5
	W9	W7
	W10	W8
Sound Board	W11	W12
	W14	W13
	W1 W9	W2 W13
	W4 W15	W3 W14
	W5 W17	W6 W16
	W7 W18	W10 W19
	W8 W20	W11 W21
		W12

NARC

Table of Contents

Chapter 1. Operating Procedures.....	1-5
Programmed Chip Summary--Part 1.....	1-2
Programmed Chips on the Sound Board.....	1-3
Jumper Table.....	1-4
Warnings and Notices.....	1-8
Examine Your Game.....	1-9
Control Locations.....	1-10
Power Turn-On.....	1-11
Game Operation.....	1-12
Player Panel (<i>Illustration</i>).....	1-13
Game Adjustments, Bookkeeping, Diagnostics.....	1-15
Main Test Menu (<i>Illustration</i>).....	1-16
Typical Audits Screen, Page 1 (<i>Illustration</i>).....	1-17
Typical Audits Screen, Page 2 (<i>Illustration</i>).....	1-18
Typical Game Adjustments Screen (<i>Illustration</i>).....	1-19
Electronic Drawings.....	1-21



Notes...



Chapter 1. Operating Procedures

Warnings and Notices
Examine Your Game
Control Locations
Power Turn-On

Game Operation
Player Panel (*Illustration*)
Game Adjustments, Bookkeeping, Diagnostics
Main Test Menu (*Illustration*)

Typical Audits Screen, Page 1 (*Illustration*)
Typical Audits Screen, Page 2 (*Illustration*)
Typical Game Adjustments Screen
(*Illustration*)

Pricing Table



Warnings and Notices

WARNING

FOR SAFETY AND RELIABILITY, substitute parts or modifications are not recommended.

USE OF NON-WILLIAMS PARTS or circuit modifications may cause injuries or equipment damage.

SUBSTITUTE PARTS OR MODIFICATIONS may void FCC Type Acceptance.

SINCE THIS GAME IS PROTECTED by Federal copyright, trademark and patent laws. Unauthorized software or hardware modifications may be illegal under Federal law.

THIS "MODIFICATION" PRINCIPLE ALSO APPLIES to unauthorized facsimiles of **WILLIAMS** logos, designs, publications and assemblies. Moreover, facsimiles of **WILLIAMS** equipment (*or any feature thereof*) may be illegal under Federal law. Whether or not such facsimiles are manufactured with **WILLIAMS** components, this rule applies.

WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this



equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

WARNING

FCC STICKER. Check the back of your game for an FCC sticker. When **WILLIAMS** ships a game, the game has been found to comply with FCC Rules. *The sticker is proof.* If the sticker is missing, *legal repercussions to the owner and distributor of the game* may result. If your game (manufactured after December 1982) has no FCC sticker, call **WILLIAMS** for advice. Or write us a note on your game-registration card. *Be sure the card bears your game's serial number.*

WARNING

THREE-WIRE PLUG. Prevent shock hazard and assure proper game operation! Only plug this game into a properly grounded outlet. **DO NOT** use a "cheater" plug to defeat the power cord's ground pin. **DO NOT** cut off the ground pin.

RF-INTERFERENCE NOTICE

YOUR GAME'S CABLE-HARNESS PLACEMENT and ground-strap routing are very important. They are designed to keep RF radiation and conduction within levels accepted by FCC Regulations.

MAINTAIN THESE LEVELS. Servicing may require that you disconnect harnesses or ground straps. When you're finished, reposition and reconnect them as they were.

Examine Your Game

- **INSPECT THE OUTSIDE** of the carton or game cabinet for shipping damage.

The Williams logo, featuring the word "WILLIAMS" in a stylized, handwritten-style font.

- **UNLOCK AND OPEN** the bottom-rear door. Now check circuitry.
- **ARE CONNECTORS SECURELY ATTACHED?** Reconnect any found loose. *Don't force connectors!* They're keyed and only fit one way.
- **ARE PLUG-IN CHIPS FIRMLY SEATED** in their sockets?
- **UNWRAP THE POWER CORD** coiled inside the cabinet. *Don't plug it in yet!*
- **SCRUTINIZE MAJOR SUBASSEMBLIES**, such as the monitor, player panel, transformer chassis and power supply. Make sure they're securely mounted.
- **UNDO THE CONTROL-PANEL LATCHES.** You can reach these from the coin door by extending your arm upward and to either side. Now check connectors and circuitry as above.

Control Locations

THE ON-OFF SWITCH is above the back (*monitor*) door. Standing before the game, you'll find the switch at the game's top-left corner.

POWER INTERLOCK SWITCH. Your game has two power-interlock switches. These are located at the back of the game, behind the top and middle panels. Imagine that you're standing behind the game. An interlock is in the upper-right corner of each panel. Each interlock is a spring-loaded DPDT switch. It turns off the game when you remove the panel. For servicing purposes, pull the switch out and the game will power up.

THE VOLUME CONTROL is inside the coin door and to your right.



THREE DIAGNOSTIC SWITCHES are mounted together on a bracket behind the coin door. *These switches are useful for many purposes: Accessing Diagnostic Mode Tests, reading the bookkeeping totals or making game adjustments.* See relevant discussions later in this chapter.

THE MEMORY-PROTECT INTERLOCK SWITCH is behind the coin door. This switch must be open when you clear bookkeeping totals or make game adjustments. It automatically opens when the coin door is open. .

THE CPU-BOARD RESET SWITCH is on the CPU Board near the +5VDC indicator LED.

Power Turn-On

WHEN THE GAME IS FIRST TURNED ON general illumination should light. In a correctly running game, tests will be followed by the message "INITIAL CHECKS INDICATE: THIS GAME IS BITCHIN'." If failure messages come up on the screen instead, refer to **Built-In Test Procedures**.

DEMAGNETIZE THE GAME with a television degaussing coil. Besides the monitor, remember to degauss large steel parts (for example, the backdoor hinge). Do this whenever you move the game, and also as a regular, monthly procedure. Otherwise residual magnetism may cause color impurities that adversely affect your collections.



Game Operation

GAME START

INSERT COINS. The game allocates an adjustable number of credits per coin. This number appears on the CRT. For example, assume that your settings specify one credit for a quarter (*U.S. factory pricing*). A player deposits a quarter and presses 1-PLAYER START. On its screen, the game posts one credit. Then a one-player game begins.

Using player-2 controls for a one-player game is also possible: With one credit displayed, press 2-PLAYER START.

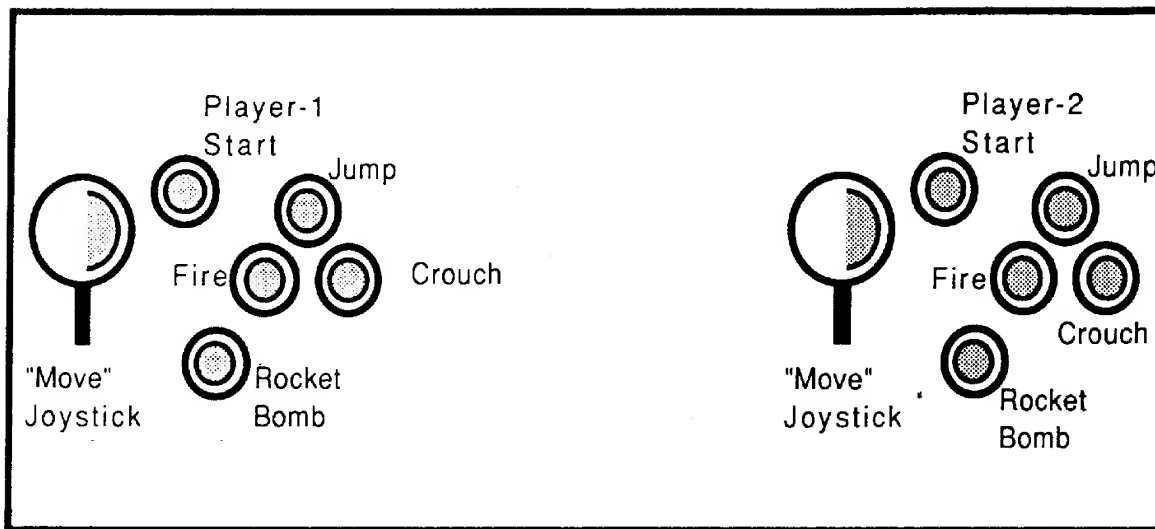
For a two-player game, at least two credits must be displayed. To initiate this two-player game, press the 2-PLAYER START button.

PLAYER CONTROLS

On its player panel, your **NARC™** game has four pushbuttons and a joystick. Players can...

- **FIRE** at evil pushers with the machine pistol.
- **PRESS ROCKET BOMB!** Eliminate several pushers in one blast!
- **JUMP** over broken sidewalks and other obstacles!
- **CROUCH** to duck bullets and garbage cans!
- **MOVE** in eight directions with the joystick.





Player Panel

GAMEPLAY

THE CITY'S OVERRUN! Slashers! Gangsters! Pimps! The punks are everywhere! The scum of the earth! And only the player can restore law and order! Trigger finger spraying hot metal before him... **ROCKET BOMB** at the ready... The player is a macho urban guerilla, defending our city from the ultimate urban scourge! This is his neighborhood too. He's committed. He says **NO** to inner city decadence. He carries a badge and a moral code. And he backs them both with screaming lead.

FEARLESS, ALOOF... He blazes away with his machine pistol. Then he launches a devastating **ROCKET BOMB** to trap several baddies in simultaneous ambush! With **JUMP** and **SQUAT** buttons, he dodges bullets, dynamite and other missiles. But the lurking Loaf, death-dealing Dumpster Man, patronizing Pimp and horrible Hypoman are everywhere. And these mangy marauders stop at nothing. This is their turf. So they'll hurl more bombs and deal more

NARC

corruption. Because they're forever preparing another rendezvous with death. Here's a list of the nefarious gangmembers...

- Loaf
- Gangster
- Pimp
- Hypoman
- Psychotic
- Slasher
- Dumpster Man
- Mr. Big (*Public Enemy Number 1*)

THIS JOB DEMANDS GRITTY DETERMINATION, FAST THINKING! The city is a *jungle*. Pushers may lurk in manholes... They may dart by in a heavily armed, pink Cadillac... Or they might even buzz the player with their preemptive pushercopter! But the player laughs at danger. He scores bonus points by seizing contraband (*evidence!*) hidden in the Cadillac. And by busting these parasites on society. Then he blows that manhole. And he downs that pushercopter. Because no pimp is too high... And no gangster's too low to eat hot justice!

ENTER BUILDINGS. The player must seek out and investigate gang strongholds. When enemies dart out of a tenement, the player must enter. If psycho fiends slither in the subway, the player relentlessly pursues them. Not bullets, not bombs, not even mad dogs can deter him. For our hero's sworn duty is to case the hideouts and seize the evidence. Then he can bust another offender!

THE PLAYER STARTS WITH 100 ENERGY UNITS. Busts and evidence win points. For every 25,000 points earned, the player receives 20 energy units. But there's a penalty whenever our hero's hit or if an innocent bystander's injured. Here are some of the major penalties...

- Hit by hypo, player loses 16 energy units



- Attacked by Slasher, player sacrifices 10 energy units
- Struck by a bullet, player's penalized five units

THE BIG TARGET. Ultimately the player pursues Public Enemy Number One, Mr. Big. Mr. Big is the shimmering, super slug king of the sleazy, slimy underworld empire. His glitzy, cosmopolitan crib is brimming with evidence. And he's the inevitable prospect for a megabust. But he's wily. He's quick. And he's amply equipped with the latest Hyper-Crimewave Technology. But the player must not permit him to escape! The dragnet must not fail!

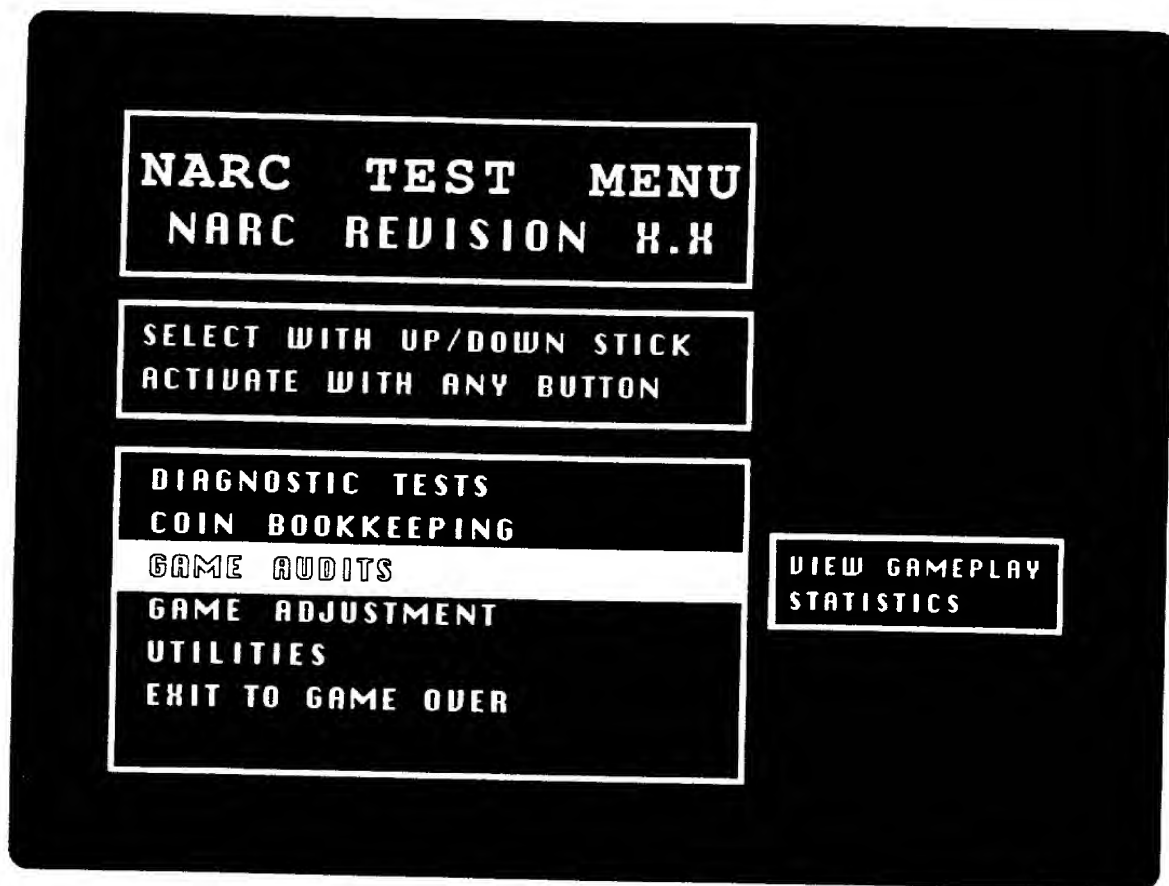
Game Adjustments, Bookkeeping, Diagnostics

MENU CONCEPT. For your convenience, game adjustment, bookkeeping, audit totals and diagnostics are *menu-driven* features. Each *menu* is a list of several choices that you may act upon as desired.

LEVELS OF MENUS. Your game has several levels of menus. That is, one menu selection will send the game to another menu. The menus are arranged in outline fashion. That is, a menu of general options selects menus of more specific options.

PRESS ADVANCE. Adjustments, bookkeeping and diagnostics are available from the main test menu. Enter the main test menu by pressing the ADVANCE button inside the coin door. ADVANCE is mounted on a bracket bolted to the inside of the door. Besides initiating diagnostics and other modes, ADVANCE permits you to browse through and alter menus. When you press ADVANCE, the game steps through the options of one menu.





Main Test Menu

Normally you may exit the menu you're inspecting and return to the previous menu. In fact, "RETURN TO MAIN MENU" and "EXIT TO GAME OVER" are typical menu options. Suppose that you select "RETURN TO MAIN MENU": *The game returns to the option where it was before on the previous menu.*

Pressing and holding ADVANCE also causes the game to exit from a menu.

NARC

However when you press and hold ADVANCE, the game exits to the next lower option on the previous menu. This capability of the ADVANCE button allows you to access menu features even when player panel controls malfunction.

GAME AUDITS

GAME AUDITS SHOW YOU AT A GLANCE if game settings are bringing you a satisfactory return on your investment! *Only games by WILLIAMS ELECTRONICS have this menu-driven feature.* Think of it as a unique way to keep your **NARC** game the *leader of the pack when it comes to earnings...*location after location, week in and week out!

GAME AUDITS	
NARC REVISION X.X	
TOTAL PLAYS	0
EXTRA MEN EARNED	0
HOURS OF SINGLE PLAY	0:00
HOURS OF DUAL PLAY	0:00
TOTAL HOURS OF PLAY	0:00
AUG. "PLAYER" GAME TIME (MIN.)	0:00
AUG. ELAPSED TIME/PLAY	0:00

NEXT AUDIT PAGE

RETURN TO MAIN MENU

Typical Audits Screen, Page 1

NARC

ENTERING AUDIT MODE. Open the coin door and press ADVANCE. You'll see the main test menu on the CRT screen. Use either joystick to highlight GAME AUDITS. Now select GAME AUDITS by pressing *any* player panel button.

GAME AUDITS		
NARC REVISION X.X		
GAMES STARTED		0
WAVE 1 REACHED		0
WAVE 2 REACHED		0
WAVE 3 REACHED		0
WAVE 4 REACHED		0
WAVE 5 REACHED		0
WAVE 6 REACHED		0
MR. BIG CONQUERED		0
PREVIOUS AUDIT PAGE		
RETURN TO MAIN MENU		

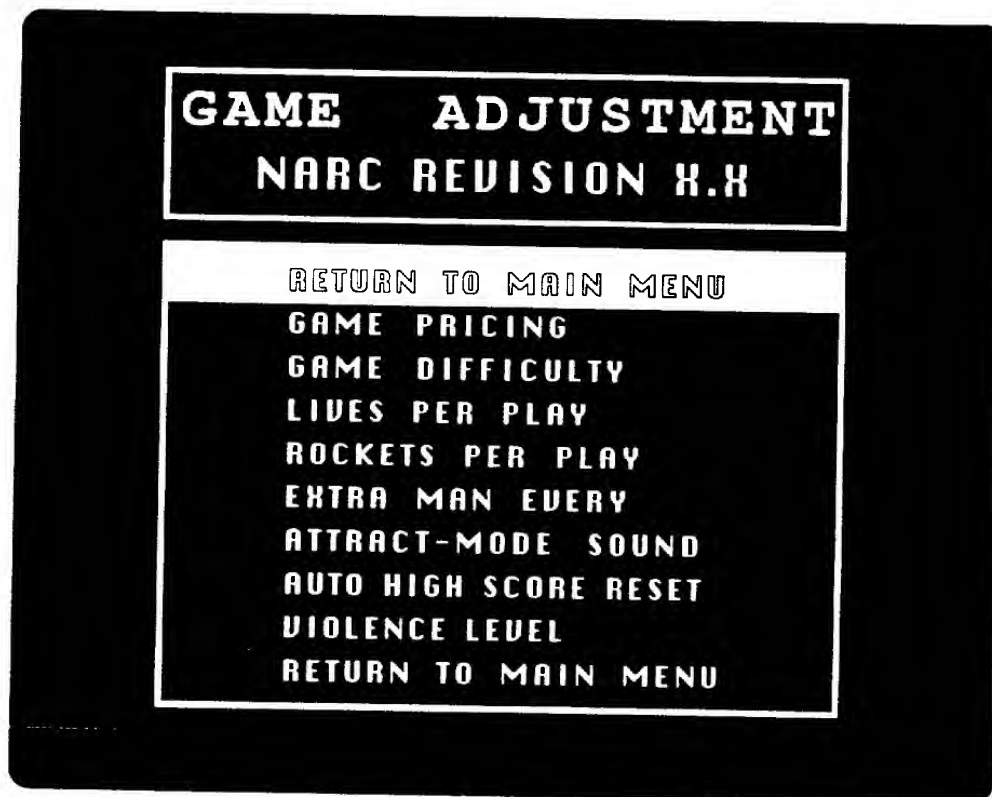
Typical Audits Screen, Page 2

The first GAME AUDITS page will appear. Total plays and the number of extra men that players earned are provided here. The remaining entries on this

NARC

page relate aspects of gameplay to time. The second audit page relates how many times players achieved each wave. (difficulty level). Now let's examine two audit entries...

AVERAGE TIME PER CREDIT: TWO MINUTES. Your most important figure on the first AUDITS page is AVG. PLAYER GAME TIME (MIN.). You'll want to pay special attention to this figure every day for this reason: Thorough field and factory research has shown that *two-minute games both satisfy players and also keep the quarters flowing.*



Typical Game Adjustments Screen

NARC

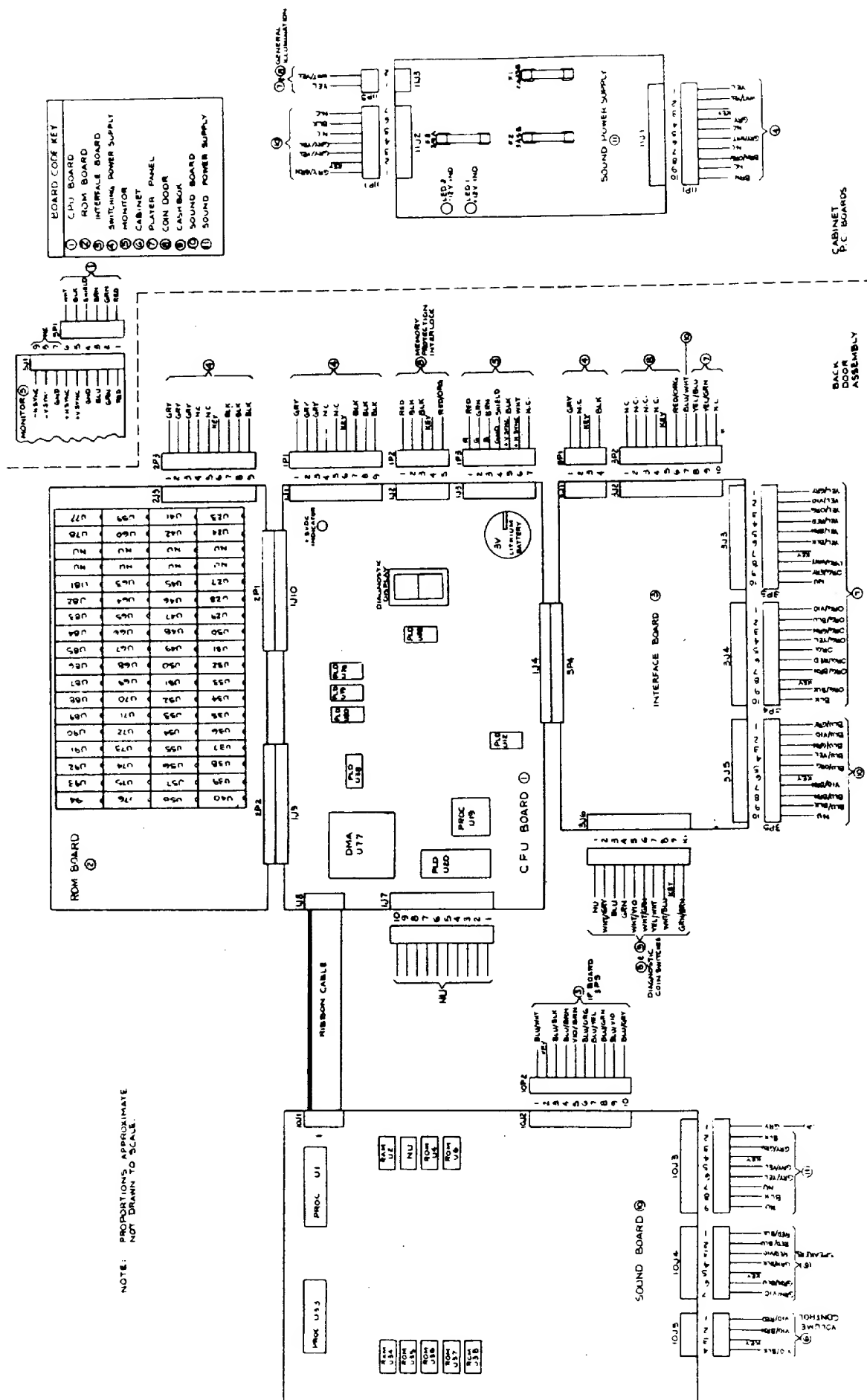
If games aren't running about two minutes long, then collections probably aren't at their peak. You'll want to tailor your game to your game-playing public. It's easy, and we'll talk about that subject in a moment. Meanwhile, another very useful figure is AVG. ELAPSED TIME/PLAY. This number tells you approximately how long your game must operate before earning a quarter.

Here are some tailoring suggestions...

EXCLUSIVE GAME ADJUSTMENTS

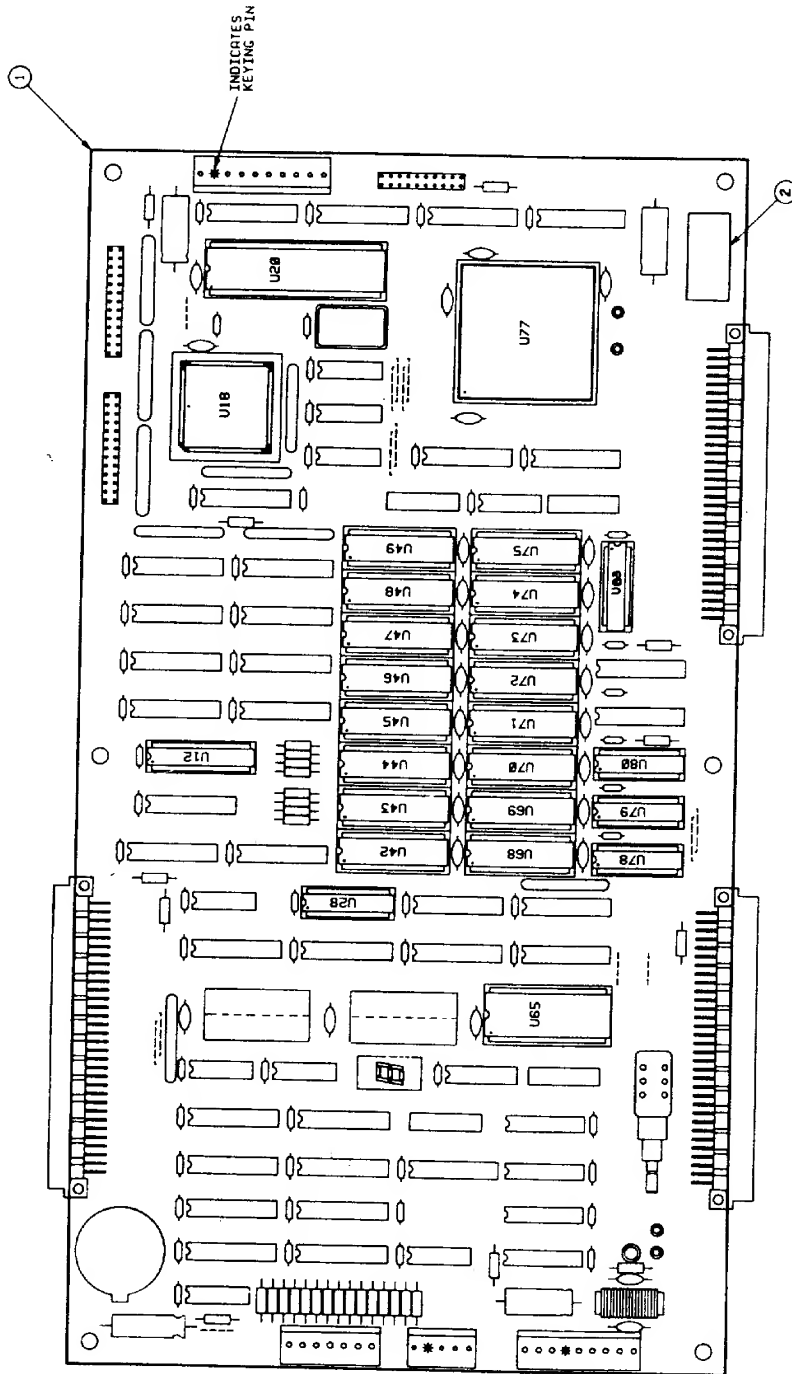
1. Press ADVANCE to enter the main test menu *(described earlier)*.
2. Using either joystick, move the selection arrow down to GAME ADJUSTMENT.
3. To select GAME ADJUSTMENT, press any player panel button. Now you'll see the adjustment screen.
4. Use either joystick to highlight the feature you desire to adjust.
5. To select that feature, press any player panel button.
6. Use either joystick to alter the value of an adjustment.
(The joystick causes YES-NO settings to toggle between YES and NO.)
7. To return to Game-Over Mode, follow menu selections on your screen.





REV	DESCRIPTION OF CHANGE	DATE
NEW PART RELEASE	13101	8-18-88
A	SEE SMT 2 OF 2	10-12-88

C-11879-



NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9017.

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	1	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	1	1	1	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	1
TOLERANCES				TOLERANCES			
UNLESS OTHERWISE SPECIFIED				UNLESS OTHERWISE SPECIFIED			
DECIMAL				DECIMAL			
FRACTIONAL				FRACTIONAL			
MATERIAL				MATERIAL			
NONE				NONE			
DATE				DATE			
12/14/88				12/14/88			
BY				BY			
J. W. S. / J. W. S.				J. W. S. / J. W. S.			
PROJECT NO.				PROJECT NO.			
16-9017				16-9017			
DRAWN BY				DRAWN BY			
J. W. S.				J. W. S.			
CHECKED BY				CHECKED BY			
J. W. S.				J. W. S.			
APPROVED BY				APPROVED BY			
J. W. S.				J. W. S.			
DATE				DATE			
12/14/88				12/14/88			
BY				BY			
J. W. S.				J. W. S.			
PROJECT NO.				PROJECT NO.			
16-9017				16-9017			
DRAWN BY				DRAWN BY			
J. W. S.				J. W. S.			
CHECKED BY				CHECKED BY			
J. W. S.				J. W. S.			
APPROVED BY				APPROVED BY			
J. W. S.				J. W. S.			
DATE				DATE			
12/14/88				12/14/88			
BY				BY			
J. W. S.				J. W. S.			

WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE.
SUNNYVALE, CA 94088
NAME
SYS-Z CPU PCB ASSEMBLY
REV
1/1
C-11879-

REV	DESCRIPTION OF CHANGE	FOR NO DATE
	NEW PART RELEASE	17101 5-17-68
A	ITEM 5 WAS 5340-1112-0 ADDED ITEM 15	17722 9-30-68

ITEMS		JUMPERS REMOVED		NONE	
1	3036				
2	3036				
3	3036				
4	3036				
5	3036				
6	3036				
7	3036				
8	3036				
9	3036				
10	3036				
11	3036				
12	3036				
13	3036				
14	3036				
15	3036				
16	3036				
17	3036				
18	3036				
19	3036				
20	3036				
21	3036				
22	3036				
23	3036				
24	3036				
25	3036				
26	3036				
27	3036				
28	3036				
29	3036				
30	3036				
31	3036				
32	3036				
33	3036				
34	3036				
35	3036				
36	3036				
37	3036				
38	3036				
39	3036				
40	3036				
41	3036				
42	3036				
43	3036				
44	3036				
45	3036				
46	3036				
47	3036				
48	3036				
49	3036				
50	3036				
51	3036				
52	3036				
53	3036				
54	3036				
55	3036				
56	3036				
57	3036				
58	3036				
59	3036				
60	3036				
61	3036				
62	3036				
63	3036				
64	3036				
65	3036				
66	3036				
67	3036				
68	3036				
69	3036				
70	3036				
71	3036				
72	3036				
73	3036				
74	3036				
75	3036				
76	3036				
77	3036				
78	3036				
79	3036				
80	3036				
81	3036				
82	3036				
83	3036				
84	3036				
85	3036				
86	3036				
87	3036				
88	3036				
89	3036				
90	3036				

ITEM	PART NO.	PART DESCRIPTION	DESCRIPTION	QTY
20				
19				
18				
17				
16				
15	5850- 11050-00	B1	BATTERY - LITHIUM 3V BUTTON	1
14	SEE CHART	U28	IC, PLD-COLOR RAM CNTL	1
13	SEE CHART	U78	IC, PLD-LOCAL CONTROL	1
12	SEE CHART	U79	IC, PLD-VIDEO RAM CNTL	1
11	SEE CHART	U80	IC, PLD-ADDRESS DECODE	1

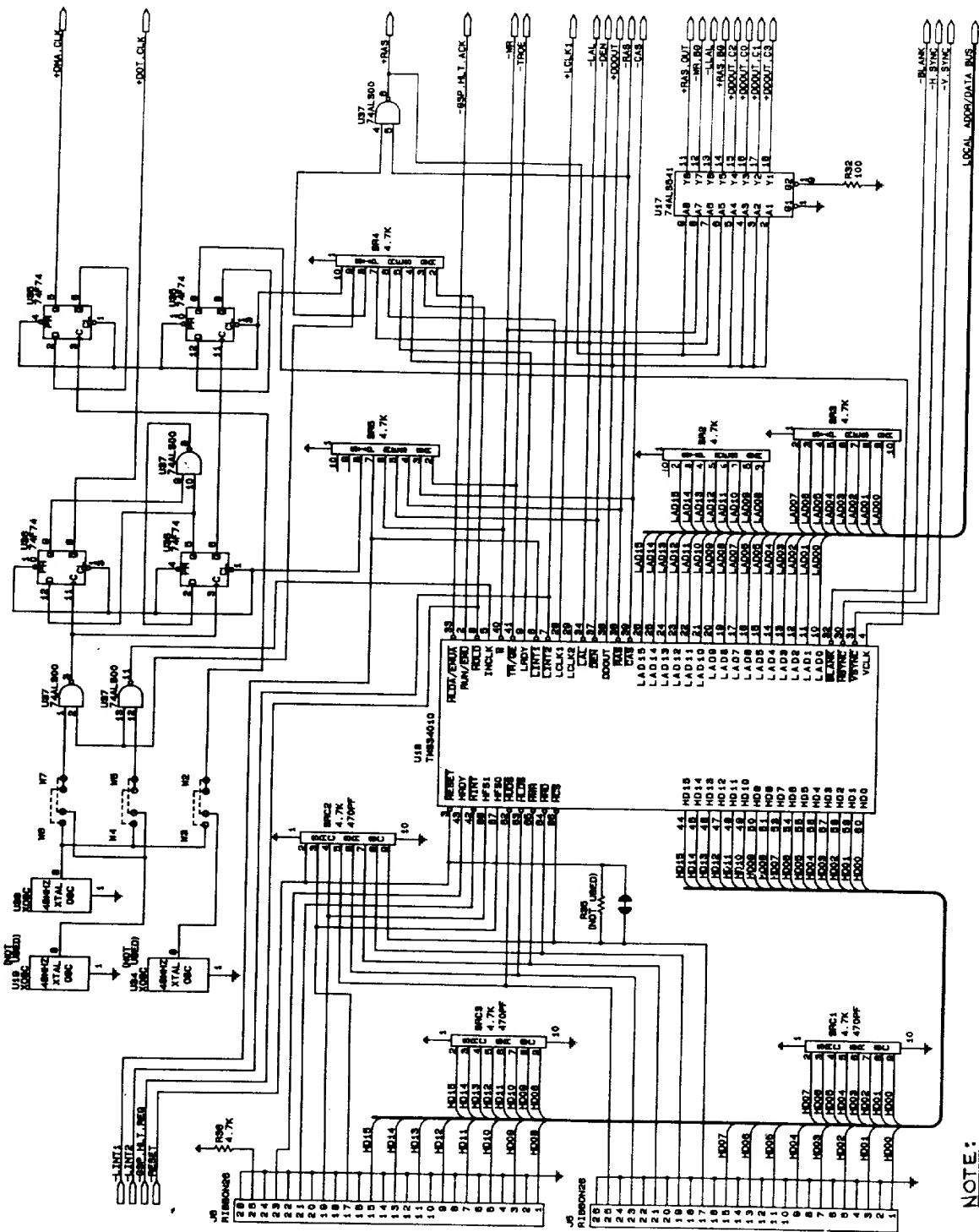
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
10	SEE CHART	U83	IC, PLD-IMAGE ROM CNTL	1
9	SEE CHART	U12	IC, PLD-VIDEO RAM SEQ.	1
8	SEE CHART	U20	IC, PLD-AUTOERASE CNTL	1
7	5340- 12019-00	U65	IC, RAM/S 5564 8K x 8	1
6	5340- 12213-00	U42 - U49 U6B - U75	IC, RAM/V 4461 24K x 4	16
5				
4	5400- 12220-00	U1B	IC, TMS34010 G.S.P.	1
3	5410- 12239-00	U77	IC, CUSTOM ASIC	1
2	16-8850 -210		LABEL, PCB IDENT.	1
1	C-11870		SYS-Z CPU PCB SUB-ASSEMBLY	1

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9017.

DO NOT SCALE	REMOVE BURR - BURR FREE COMPONENTS & EXPOSE	WILLIAMS ELECTRONICS, INC.	
WORK TO DIMENSIONS	TOLERANCES UNLESS OTHERWISE SPECIFIED	3401 S. CALIFORNIA AVE. CHICAGO, ILL. 60608	
DATE 12-11-74	DECIMAL — .001 ANGULAR — 1/2°	NAME	
QUANTITY 1000	FRACTIONAL 1/64	SYS-Z CPU PCB ASSEMBLY	
DATE 12-11-74	MATERIAL	SCALE	1" = 1/2" PART NO. C-11879 REV. A

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	5-18-78
2	SEE COVER SMT	1-12-78
3		1-30-78

16-9017



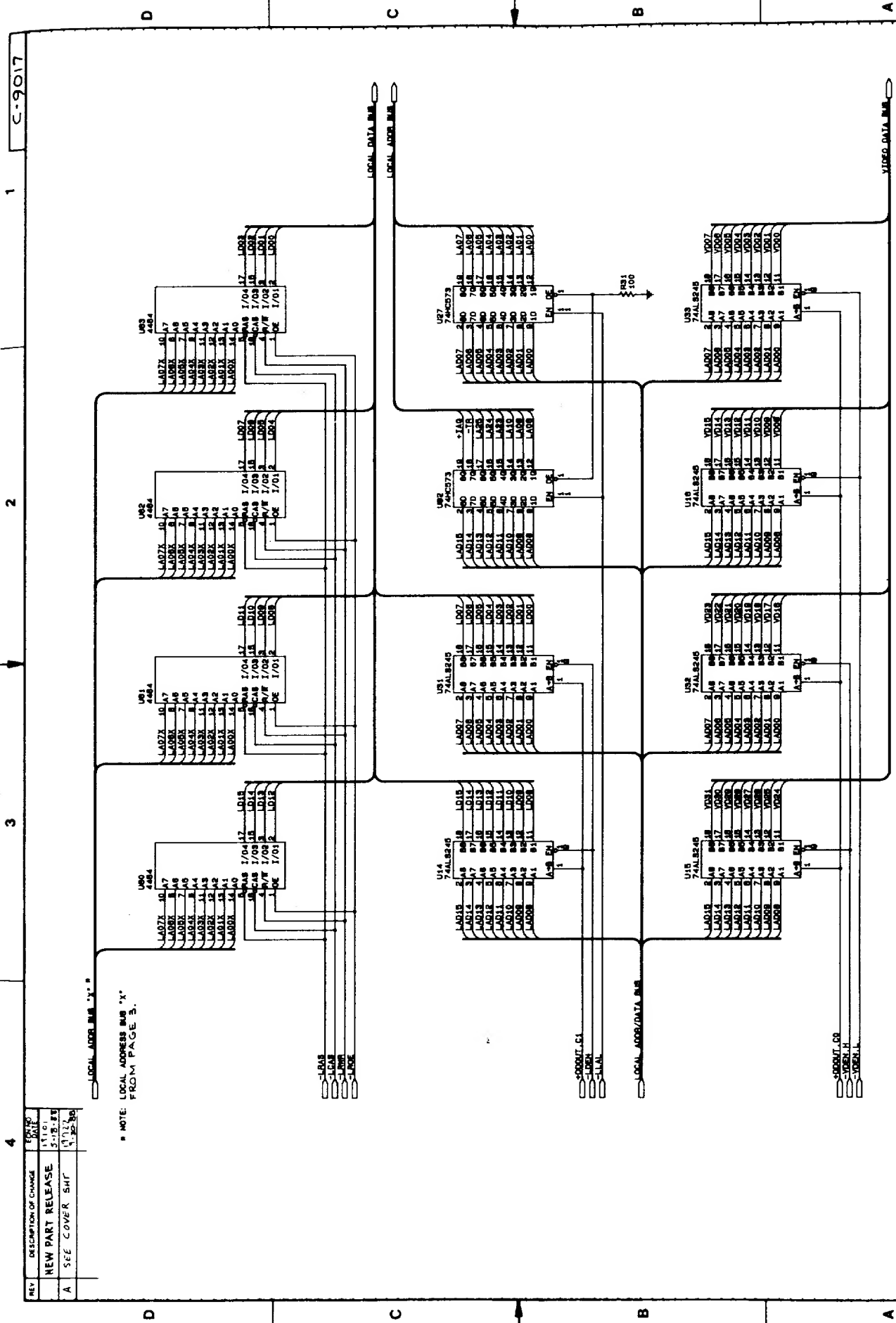
NOTE:
BUS & SIGNAL LABELS DESIGNATED WITH
AN "X" SUFFIX ARE FORMED FROM ROOT
SIGNALS DRIVEN THROUGH SERIES
RESISTORS.

ITEM		PART NUMBER	QTY	ITEM	DESCRIPTION
DO NOT SCALE		REMOVE BURR - BREAK SWAMP CORROS & VISE			
M. OFFERED		UNLESS OTHERWISE SPECIFIED			
DATE		TOLERANCE			
G. SHIPP		DECIMAL			
DATE		FRACTIONAL			
DATE		MATERIAL			
DATE		PROJECT NO			
DATE		C-1876			
DATE		C-1876			

WILLIAMS ELECTRONICS, INC.
1801N CALIFORNIA AVE
FOLSOM, CALIF 95630

NAME
SCALE
PART NO
REV

16-9017



REV	DESCRIPTION OF CHANGE	DATE	BY
1	NEW PART RELEASE	5-18-85	11101
2	SEE COVER SHEET	1-12-86	11101

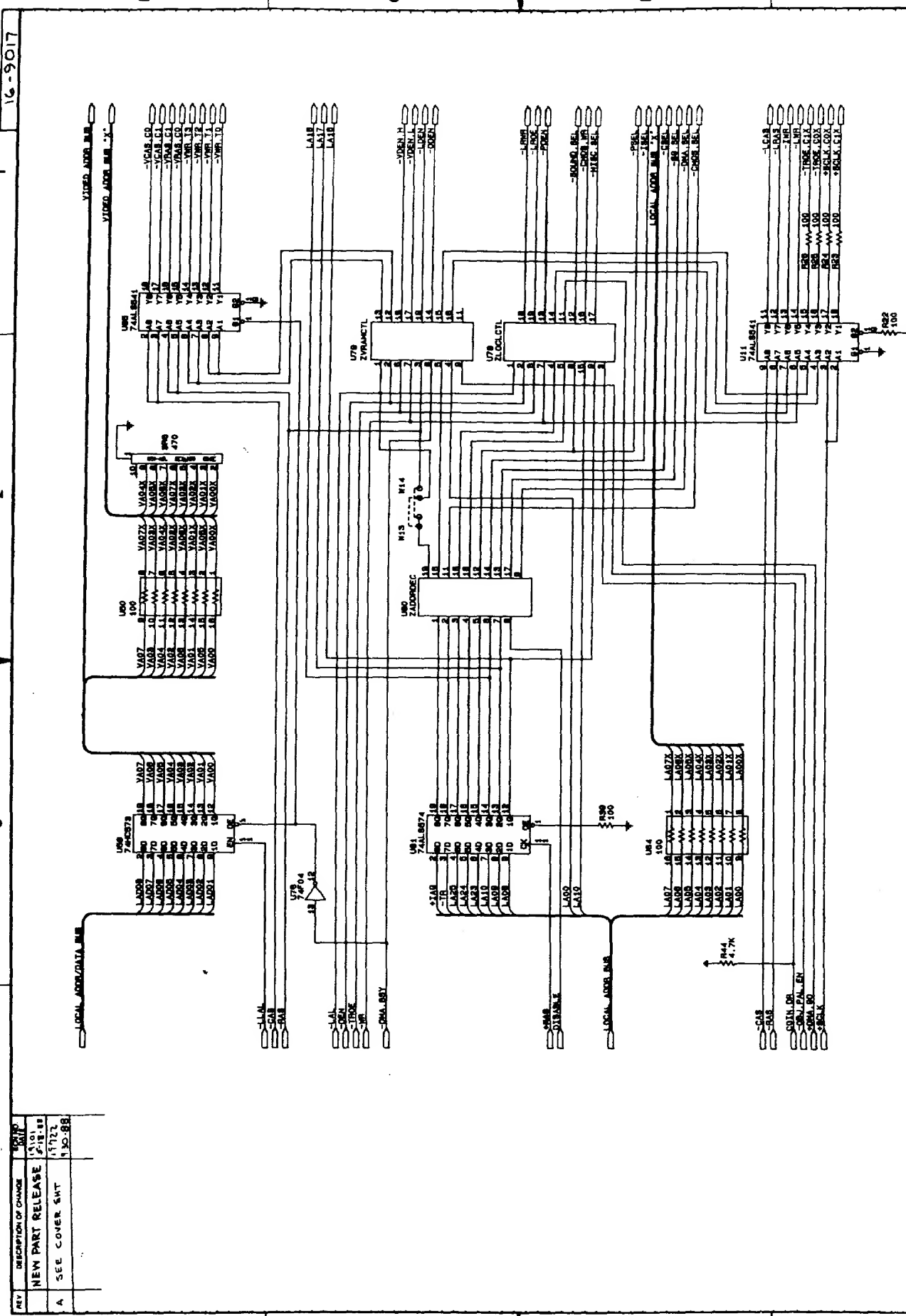
ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	U1	74ALB245	1	1	U1	74ALB245	1
2	U2	74ALB245	1	2	U2	74ALB245	1
3	U3	74ALB245	1	3	U3	74ALB245	1
4	U4	74ALB245	1	4	U4	74ALB245	1
5	U5	74ALB245	1	5	U5	74ALB245	1
6	U6	74ALB245	1	6	U6	74ALB245	1
7	U7	74ALB245	1	7	U7	74ALB245	1
8	U8	74ALB245	1	8	U8	74ALB245	1
9	U9	74ALB245	1	9	U9	74ALB245	1
10	U10	74ALB245	1	10	U10	74ALB245	1
11	U11	74ALB245	1	11	U11	74ALB245	1
12	U12	74ALB245	1	12	U12	74ALB245	1
13	U13	74ALB245	1	13	U13	74ALB245	1
14	U14	74ALB245	1	14	U14	74ALB245	1
15	U15	74ALB245	1	15	U15	74ALB245	1
16	U16	74ALB245	1	16	U16	74ALB245	1
17	U17	74ALB245	1	17	U17	74ALB245	1
18	U18	74ALB245	1	18	U18	74ALB245	1
19	U19	74ALB245	1	19	U19	74ALB245	1
20	U20	74ALB245	1	20	U20	74ALB245	1
21	U21	74ALB245	1	21	U21	74ALB245	1
22	U22	74ALB245	1	22	U22	74ALB245	1
23	U23	74ALB245	1	23	U23	74ALB245	1
24	U24	74ALB245	1	24	U24	74ALB245	1
25	U25	74ALB245	1	25	U25	74ALB245	1
26	U26	74ALB245	1	26	U26	74ALB245	1
27	U27	74ALB245	1	27	U27	74ALB245	1
28	U28	74ALB245	1	28	U28	74ALB245	1
29	U29	74ALB245	1	29	U29	74ALB245	1
30	U30	74ALB245	1	30	U30	74ALB245	1
31	U31	74ALB245	1	31	U31	74ALB245	1
32	U32	74ALB245	1	32	U32	74ALB245	1
33	U33	74ALB245	1	33	U33	74ALB245	1
34	U34	74ALB245	1	34	U34	74ALB245	1
35	U35	74ALB245	1	35	U35	74ALB245	1
36	U36	74ALB245	1	36	U36	74ALB245	1
37	U37	74ALB245	1	37	U37	74ALB245	1
38	U38	74ALB245	1	38	U38	74ALB245	1
39	U39	74ALB245	1	39	U39	74ALB245	1
40	U40	74ALB245	1	40	U40	74ALB245	1
41	U41	74ALB245	1	41	U41	74ALB245	1
42	U42	74ALB245	1	42	U42	74ALB245	1
43	U43	74ALB245	1	43	U43	74ALB245	1
44	U44	74ALB245	1	44	U44	74ALB245	1
45	U45	74ALB245	1	45	U45	74ALB245	1
46	U46	74ALB245	1	46	U46	74ALB245	1
47	U47	74ALB245	1	47	U47	74ALB245	1
48	U48	74ALB245	1	48	U48	74ALB245	1
49	U49	74ALB245	1	49	U49	74ALB245	1
50	U50	74ALB245	1	50	U50	74ALB245	1
51	U51	74ALB245	1	51	U51	74ALB245	1
52	U52	74ALB245	1	52	U52	74ALB245	1
53	U53	74ALB245	1	53	U53	74ALB245	1
54	U54	74ALB245	1	54	U54	74ALB245	1
55	U55	74ALB245	1	55	U55	74ALB245	1
56	U56	74ALB245	1	56	U56	74ALB245	1
57	U57	74ALB245	1	57	U57	74ALB245	1
58	U58	74ALB245	1	58	U58	74ALB245	1
59	U59	74ALB245	1	59	U59	74ALB245	1
60	U60	74ALB245	1	60	U60	74ALB245	1
61	U61	74ALB245	1	61	U61	74ALB245	1
62	U62	74ALB245	1	62	U62	74ALB245	1
63	U63	74ALB245	1	63	U63	74ALB245	1
64	U64	74ALB245	1	64	U64	74ALB245	1
65	U65	74ALB245	1	65	U65	74ALB245	1
66	U66	74ALB245	1	66	U66	74ALB245	1
67	U67	74ALB245	1	67	U67	74ALB245	1
68	U68	74ALB245	1	68	U68	74ALB245	1
69	U69	74ALB245	1	69	U69	74ALB245	1
70	U70	74ALB245	1	70	U70	74ALB245	1
71	U71	74ALB245	1	71	U71	74ALB245	1
72	U72	74ALB245	1	72	U72	74ALB245	1
73	U73	74ALB245	1	73	U73	74ALB245	1
74	U74	74ALB245	1	74	U74	74ALB245	1
75	U75	74ALB245	1	75	U75	74ALB245	1
76	U76	74ALB245	1	76	U76	74ALB245	1
77	U77	74ALB245	1	77	U77	74ALB245	1
78	U78	74ALB245	1	78	U78	74ALB245	1
79	U79	74ALB245	1	79	U79	74ALB245	1
80	U80	74ALB245	1	80	U80	74ALB245	1
81	U81	74ALB245	1	81	U81	74ALB245	1
82	U82	74ALB245	1	82	U82	74ALB245	1
83	U83	74ALB245	1	83	U83	74ALB245	1
84	U84	74ALB245	1	84	U84	74ALB245	1
85	U85	74ALB245	1	85	U85	74ALB245	1
86	U86	74ALB245	1	86	U86	74ALB245	1
87	U87	74ALB245	1	87	U87	74ALB245	1
88	U88	74ALB245	1	88	U88	74ALB245	1
89	U89	74ALB245	1	89	U89	74ALB245	1
90	U90	74ALB245	1	90	U90	74ALB245	1
91	U91	74ALB245	1	91	U91	74ALB245	1
92	U92	74ALB245	1	92	U92	74ALB245	1
93	U93	74ALB245	1	93	U93	74ALB245	1
94	U94	74ALB245	1	94	U94	74ALB245	1
95	U95	74ALB245	1	95	U95	74ALB245	1
96	U96	74ALB245	1	96	U96	74ALB245	1
97	U97	74ALB245	1	97	U97	74ALB245	1
98	U98	74ALB245	1	98	U98	74ALB245	1
99	U99	74ALB245	1	99	U99	74ALB245	1
100	U100	74ALB245	1	100	U100	74ALB245	1

NOTE: LOCAL ADDRESS SUB 'X' FROM PAGE 3.

WILLIAMS ELECTRONICS, INC.
 3401 N. CALPOMMA AVE
 CHICAGO, IL 60642
 SYS-Z CPU BD SCHEMATIC
 SCALE: 1/2" = 1" PART NO. 16-9017

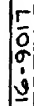
PROJ. ENGR. J. L. LOFFREDO
 DATE: 5-11-85
 DESIGNED BY: J. L. LOFFREDO
 CHECKED BY: J. L. LOFFREDO
 APPROVED BY: J. L. LOFFREDO
 SCALE: 1/2" = 1" PART NO. 16-9017

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	11-10-88
2	SEE COVER SHEET	11-10-88

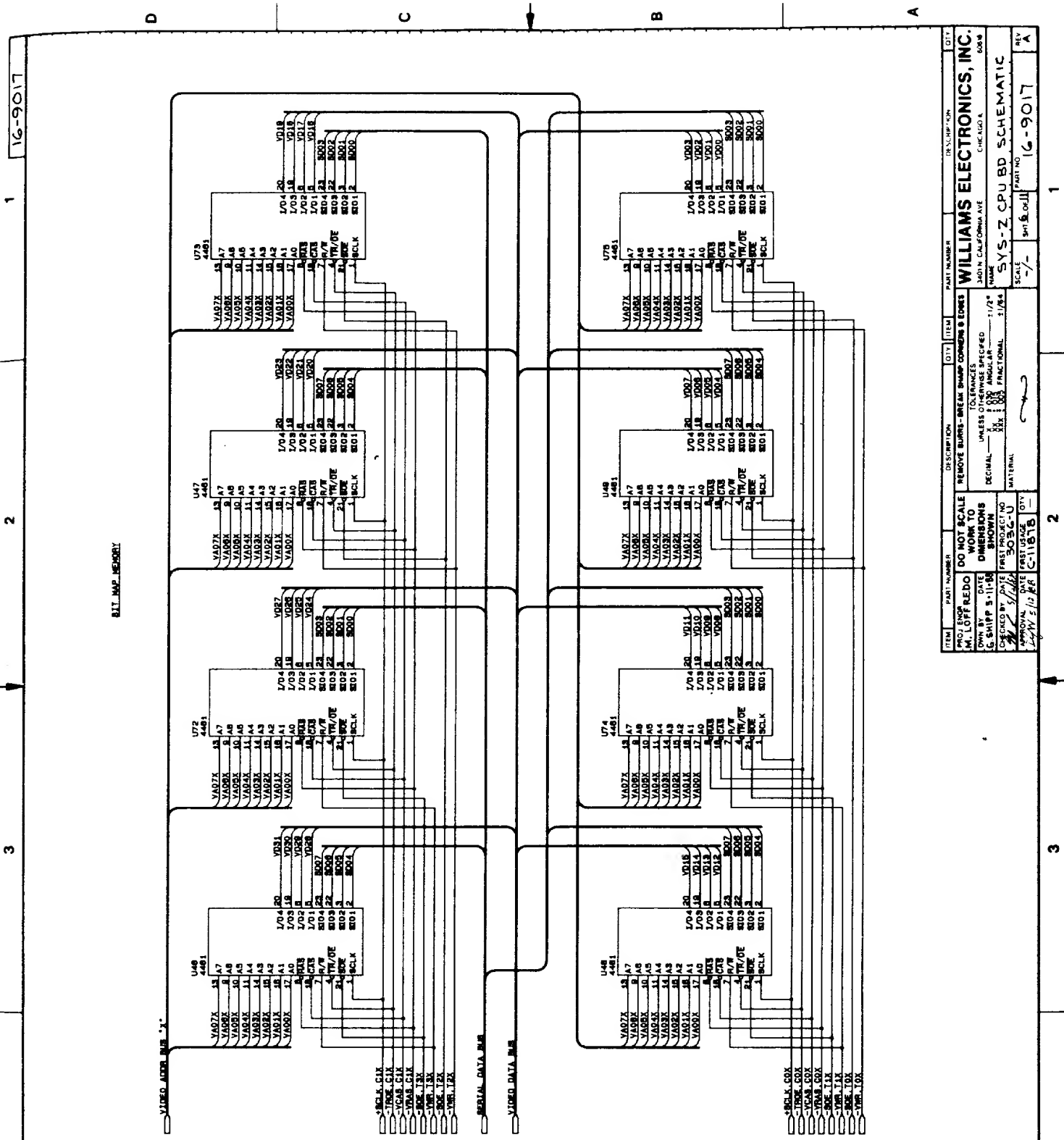


ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS ELECTRONICS, INC.	REMOVE BURRS-BREAK CORNERS & EDGES			WILLIAMS ELECTRONICS, INC.	REMOVE BURRS-BREAK CORNERS & EDGES	
2	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED			DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	
3	DATE	DECIMAL			DATE	DECIMAL	
4	SHIP	FRACTIONAL			SHIP	FRACTIONAL	
5	CHECKED	FIRST PROJECT NO			CHECKED	FIRST PROJECT NO	
6	DATE	306C-U			DATE	306C-U	
7	DATE	306C-U			DATE	306C-U	
8	DATE	306C-U			DATE	306C-U	
9	DATE	306C-U			DATE	306C-U	
10	DATE	306C-U			DATE	306C-U	
11	DATE	306C-U			DATE	306C-U	
12	DATE	306C-U			DATE	306C-U	
13	DATE	306C-U			DATE	306C-U	
14	DATE	306C-U			DATE	306C-U	
15	DATE	306C-U			DATE	306C-U	
16	DATE	306C-U			DATE	306C-U	
17	DATE	306C-U			DATE	306C-U	
18	DATE	306C-U			DATE	306C-U	
19	DATE	306C-U			DATE	306C-U	
20	DATE	306C-U			DATE	306C-U	
21	DATE	306C-U			DATE	306C-U	
22	DATE	306C-U			DATE	306C-U	
23	DATE	306C-U			DATE	306C-U	
24	DATE	306C-U			DATE	306C-U	
25	DATE	306C-U			DATE	306C-U	
26	DATE	306C-U			DATE	306C-U	
27	DATE	306C-U			DATE	306C-U	
28	DATE	306C-U			DATE	306C-U	
29	DATE	306C-U			DATE	306C-U	
30	DATE	306C-U			DATE	306C-U	
31	DATE	306C-U			DATE	306C-U	
32	DATE	306C-U			DATE	306C-U	
33	DATE	306C-U			DATE	306C-U	
34	DATE	306C-U			DATE	306C-U	
35	DATE	306C-U			DATE	306C-U	
36	DATE	306C-U			DATE	306C-U	
37	DATE	306C-U			DATE	306C-U	
38	DATE	306C-U			DATE	306C-U	
39	DATE	306C-U			DATE	306C-U	
40	DATE	306C-U			DATE	306C-U	
41	DATE	306C-U			DATE	306C-U	
42	DATE	306C-U			DATE	306C-U	
43	DATE	306C-U			DATE	306C-U	
44	DATE	306C-U			DATE	306C-U	
45	DATE	306C-U			DATE	306C-U	
46	DATE	306C-U			DATE	306C-U	
47	DATE	306C-U			DATE	306C-U	
48	DATE	306C-U			DATE	306C-U	
49	DATE	306C-U			DATE	306C-U	
50	DATE	306C-U			DATE	306C-U	
51	DATE	306C-U			DATE	306C-U	
52	DATE	306C-U			DATE	306C-U	
53	DATE	306C-U			DATE	306C-U	
54	DATE	306C-U			DATE	306C-U	
55	DATE	306C-U			DATE	306C-U	
56	DATE	306C-U			DATE	306C-U	
57	DATE	306C-U			DATE	306C-U	
58	DATE	306C-U			DATE	306C-U	
59	DATE	306C-U			DATE	306C-U	
60	DATE	306C-U			DATE	306C-U	
61	DATE	306C-U			DATE	306C-U	
62	DATE	306C-U			DATE	306C-U	
63	DATE	306C-U			DATE	306C-U	
64	DATE	306C-U			DATE	306C-U	
65	DATE	306C-U			DATE	306C-U	
66	DATE	306C-U			DATE	306C-U	
67	DATE	306C-U			DATE	306C-U	
68	DATE	306C-U			DATE	306C-U	
69	DATE	306C-U			DATE	306C-U	
70	DATE	306C-U			DATE	306C-U	
71	DATE	306C-U			DATE	306C-U	
72	DATE	306C-U			DATE	306C-U	
73	DATE	306C-U			DATE	306C-U	
74	DATE	306C-U			DATE	306C-U	
75	DATE	306C-U			DATE	306C-U	
76	DATE	306C-U			DATE	306C-U	
77	DATE	306C-U			DATE	306C-U	
78	DATE	306C-U			DATE	306C-U	
79	DATE	306C-U			DATE	306C-U	
80	DATE	306C-U			DATE	306C-U	
81	DATE	306C-U			DATE	306C-U	
82	DATE	306C-U			DATE	306C-U	
83	DATE	306C-U			DATE	306C-U	
84	DATE	306C-U			DATE	306C-U	
85	DATE	306C-U			DATE	306C-U	
86	DATE	306C-U			DATE	306C-U	
87	DATE	306C-U			DATE	306C-U	
88	DATE	306C-U			DATE	306C-U	
89	DATE	306C-U			DATE	306C-U	
90	DATE	306C-U			DATE	306C-U	
91	DATE	306C-U			DATE	306C-U	
92	DATE	306C-U			DATE	306C-U	
93	DATE	306C-U			DATE	306C-U	
94	DATE	306C-U			DATE	306C-U	
95	DATE	306C-U			DATE	306C-U	
96	DATE	306C-U			DATE	306C-U	
97	DATE	306C-U			DATE	306C-U	
98	DATE	306C-U			DATE	306C-U	
99	DATE	306C-U			DATE	306C-U	
100	DATE	306C-U			DATE	306C-U	

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS ELECTRONICS, INC.	REMOVE BURRS-BREAK CORNERS & EDGES			WILLIAMS ELECTRONICS, INC.	REMOVE BURRS-BREAK CORNERS & EDGES	
2	DO NOT SCALE	UNLESS OTHERWISE SPECIFIED			DO NOT SCALE	UNLESS OTHERWISE SPECIFIED	
3	DATE	DECIMAL			DATE	DECIMAL	
4	SHIP	FRACTIONAL			SHIP	FRACTIONAL	
5	CHECKED	FIRST PROJECT NO			CHECKED	FIRST PROJECT NO	
6	DATE	306C-U			DATE	306C-U	
7	DATE	306C-U			DATE	306C-U	
8	DATE	306C-U			DATE	306C-U	
9	DATE	306C-U			DATE	306C-U	
10	DATE	306C-U			DATE	306C-U	
11	DATE	306C-U			DATE	306C-U	
12	DATE	306C-U			DATE	306C-U	
13	DATE	306C-U			DATE	306C-U	
14	DATE	306C-U			DATE	306C-U	
15	DATE	306C-U			DATE	306C-U	
16	DATE	306C-U			DATE	306C-U	
17	DATE	306C-U			DATE	306C-U	
18	DATE	306C-U			DATE	306C-U	
19	DATE	306C-U			DATE	306C-U	
20	DATE	306C-U			DATE	306C-U	
21	DATE	306C-U			DATE	306C-U	
22	DATE	306C-U			DATE	306C-U	
23	DATE	306C-U			DATE	306C-U	
24	DATE	306C-U			DATE	306C-U	
25	DATE	306C-U			DATE	306C-U	
26	DATE	306C-U			DATE	306C-U	
27	DATE	306C-U			DATE	306C-U	
28	DATE	306C-U			DATE	306C-U	
29	DATE	306C-U			DATE	306C-U	
30	DATE	306C-U			DATE	306C-U	
31	DATE	306C-U			DATE	306C-U	
32	DATE	306C-U			DATE	306C-U	
33	DATE	306C-U			DATE	306C-U	
34	DATE	306C-U			DATE	306C-U	
35	DATE	306C-U			DATE	306C-U	
36	DATE	306C-U			DATE	306C-U	
37	DATE	306C-U			DATE	306C-U	
38	DATE	306C-U			DATE	306C-U	
39	DATE	306C-U			DATE	306C-U	
40	DATE	306C-U			DATE	306C-U	
41	DATE	306C-U			DATE	306C-U	
42	DATE	306C-U			DATE	306C-U	
43	DATE	306C-U			DATE	306C-U	
44	DATE	306C-U			DATE	306C-U	
45	DATE	306C-U					

21

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	9-13-88
2	SEE COVER SHEET	9-13-88

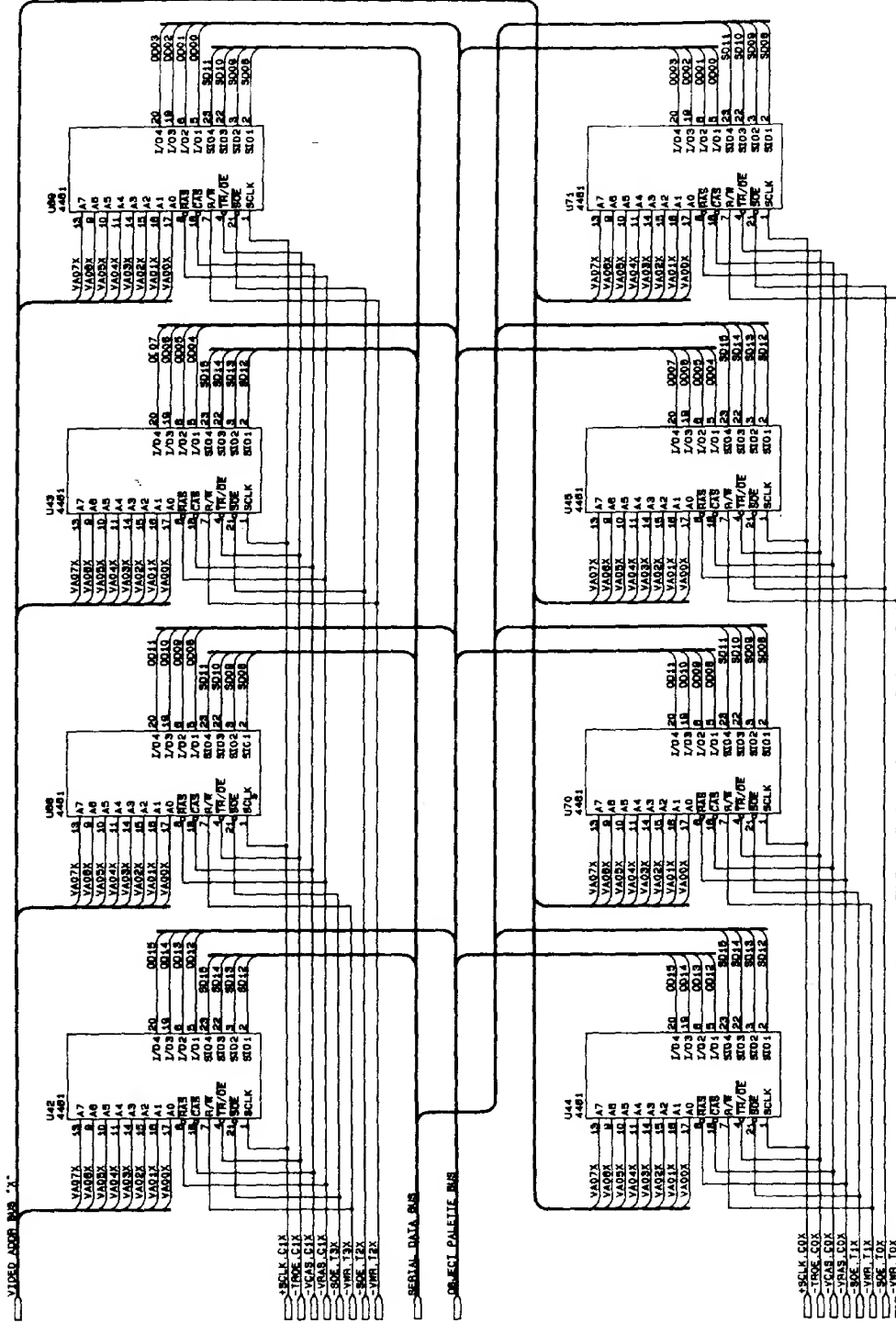


ITEM		PART NUMBER		DESCRIPTION		QTY		ITEM		PART NUMBER		QTY	
PROJECT		M. LOPFED		REMOVE BURST BREAK SHAP CONDUCT 8 DORS		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"	
DATE		5-11-88		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"		1/2"	
CHECKED BY		DATE		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"		1/2"	
APPROVAL		DATE		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"		1/2"	
1-17-88		5-11-88		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"		1/2"	
1-17-88		5-11-88		UNLESS OTHERWISE SPECIFIED		DECIMAL		1/2"		1/2"		1/2"	

WILLIAMS ELECTRONICS, INC.		16-9017	
3401 N. CALIFORNIA AVE.		16-9017	
CHICAGO, ILL.		16-9017	
SYS-Z CPU BD SCHEMATIC		16-9017	
SCALE		16-9017	
PART NO		16-9017	
REV		16-9017	

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	1970-08
2	SEE COVER SHEET	1972-11-30-82

OBJECT PALETTE MEMORY



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	U42	4481	1	1	U42	4481	1
2	U44	4481	1	2	U44	4481	1
3	U46	4481	1	3	U46	4481	1
4	U48	4481	1	4	U48	4481	1

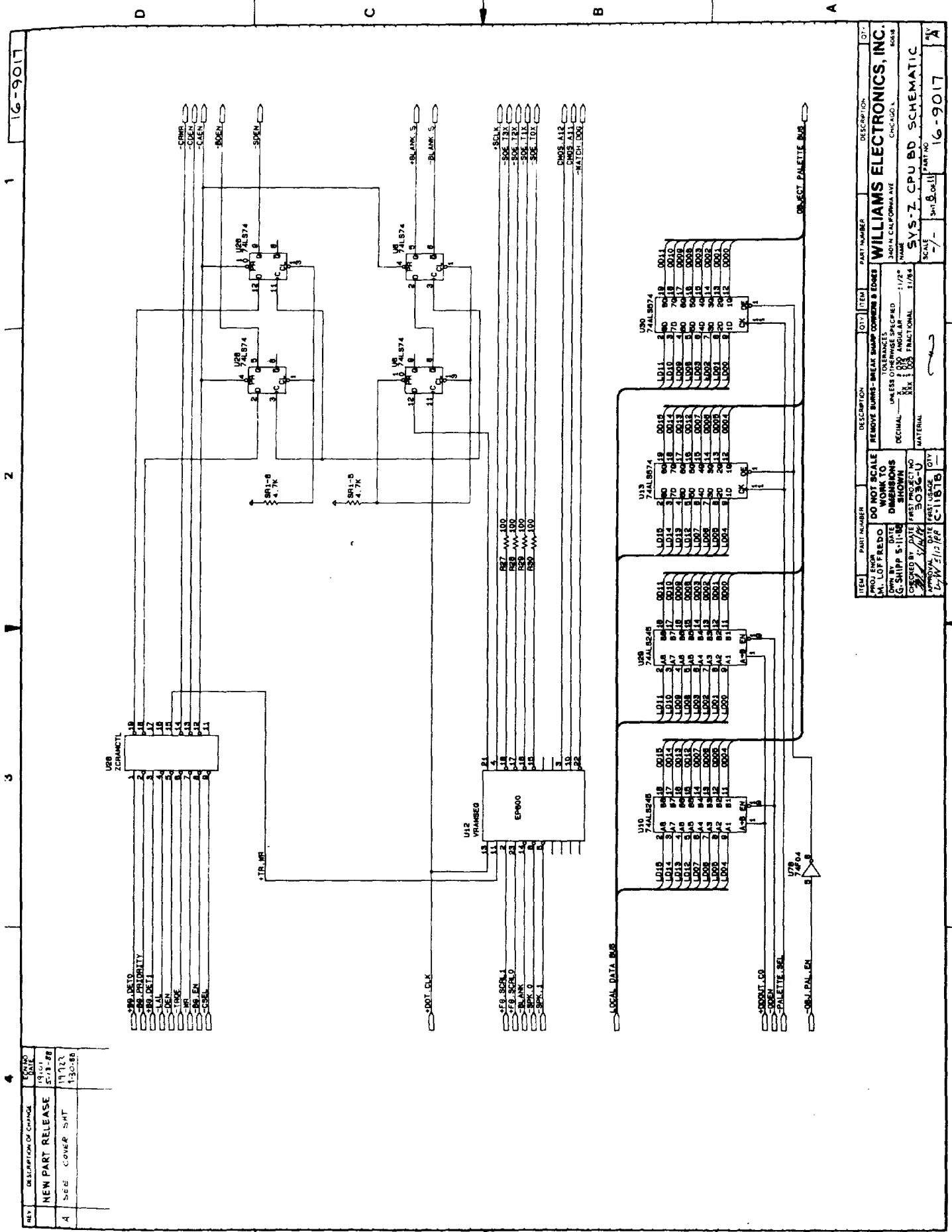
DO NOT SCALE WORK TO DIMENSIONS

UNLESS OTHERWISE SPECIFIED

DECIMAL: 1/100 FRACTIONAL: 1/64

WILLIAMS ELECTRONICS, INC.

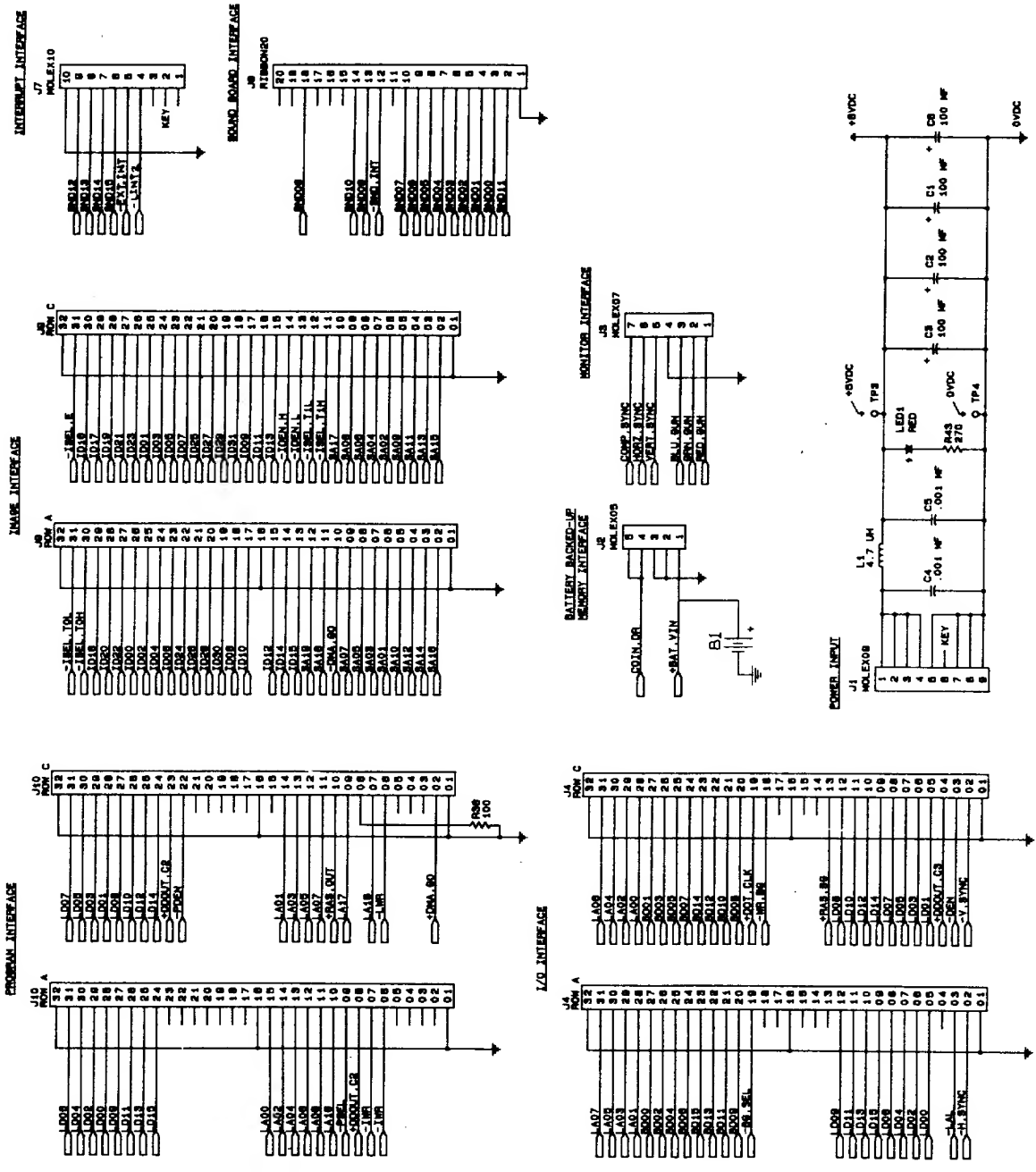
16-9017



REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	1901
2	SEE COVER SMT	1901
3		1901
4		1901

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	M. LOFFREDO	DO NOT SCALE		PROJ ENGR	M. LOFFREDO	DO NOT SCALE	
DATE	5/1/80	WORK TO		DATE	5/1/80	WORK TO	
BY	G. SHIPP	DIMENSIONS		BY	G. SHIPP	DIMENSIONS	
CHECKED	5/1/80	PROJECT NO	3036-U	CHECKED	5/1/80	PROJECT NO	3036-U
APPROVAL	5/1/80	PREP	5/1/80	APPROVAL	5/1/80	PREP	5/1/80
DATE	5/1/80	DATE	5/1/80	DATE	5/1/80	DATE	5/1/80
TIME	11:00	TIME	11:00	TIME	11:00	TIME	11:00
SCALE	1/8"	SCALE	1/8"	SCALE	1/8"	SCALE	1/8"
WILLIAMS ELECTRONICS, INC.				WILLIAMS ELECTRONICS, INC.			
3401 N. CALIFORNIA AVE.				3401 N. CALIFORNIA AVE.			
CHICAGO, ILL. 60644				CHICAGO, ILL. 60644			
SYS-7 CPU BD SCHEMATIC				SYS-7 CPU BD SCHEMATIC			
SCALE				SCALE			
1/8"				1/8"			
16-9017				16-9017			

REV	DESCRIPTION OF CHANGE	DATE
NEW PART RELEASE	19101	5/18-88
A	SEE COVER SHT	11/12
		4/30-88



ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	REV
1	16-9017	SVS-Z CPU BD SCHEMATIC	1	PCB	1
2	16-9017	SVS-Z CPU BD SCHEMATIC	1	PCB	1
3	16-9017	SVS-Z CPU BD SCHEMATIC	1	PCB	1
4	16-9017	SVS-Z CPU BD SCHEMATIC	1	PCB	1

WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE.
CHICAGO, IL 60641

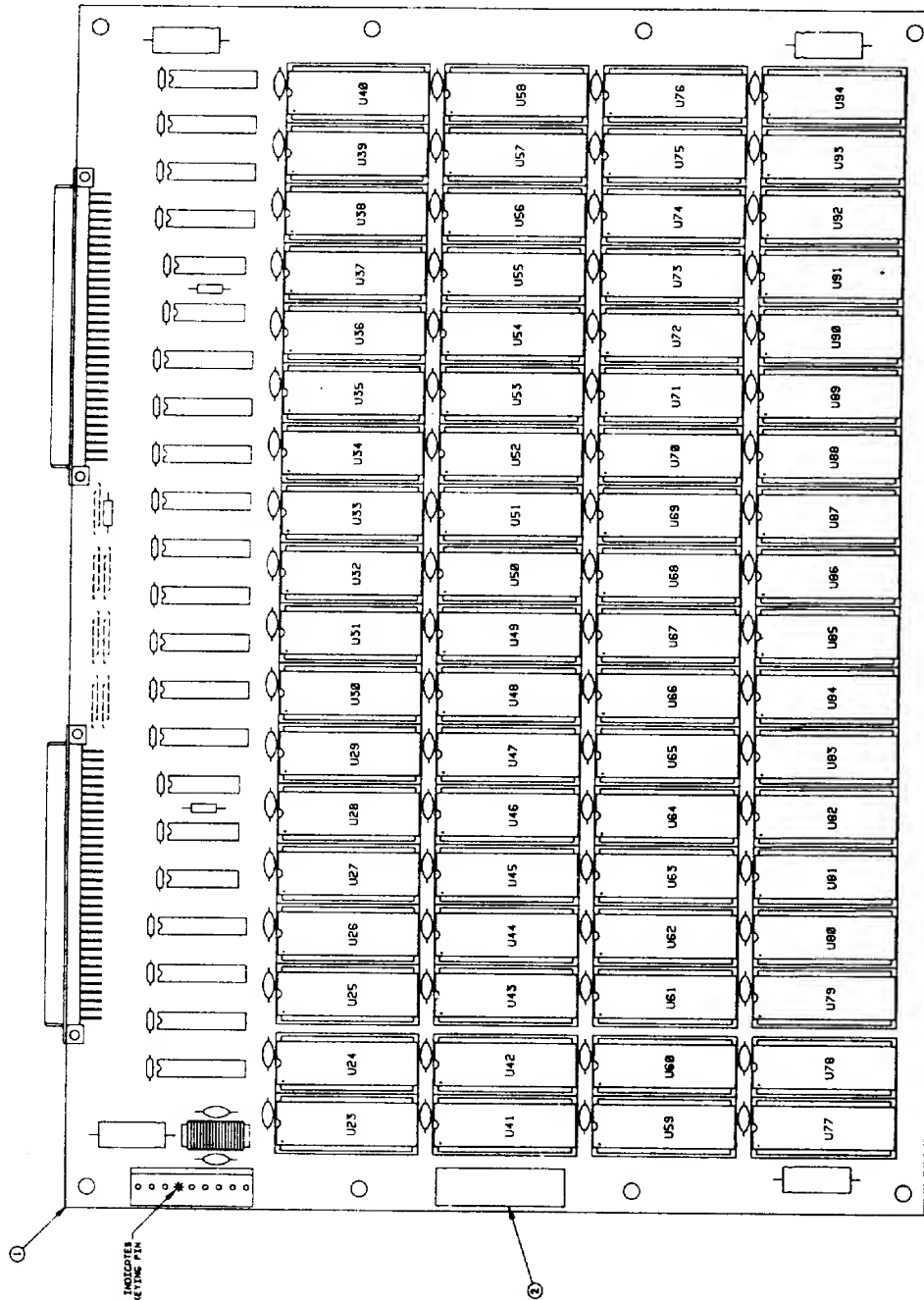
SVS-Z CPU BD SCHEMATIC

REVISIONS:

REV	DESCRIPTION	DATE
1	16-9017	5/18-88
2	16-9017	11/12
3	16-9017	4/30-88

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	5-1-78

C-12260-



NOTES: 1. FOR SCHEMATIC, REFER TO DRAWING NO. 16-9041.
2. 28-PIN DEVICES (I.E. 27S12 EPROMS) SHOULD BE BOTTOM BOTTOM JUSTIFIED IN SOCKETS.

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS ELECTRONICS, INC.	REMOVE BURR - METAL SHARP CORNERS & EDGES			WILLIAMS ELECTRONICS, INC.		
2	DO NOT SCALE	TOLERANCES			NAME		
3	UNLESS OTHERWISE SPECIFIED	UNLESS OTHERWISE SPECIFIED			ADDRESS		
4	DATE	DATE			CITY		
5	6/17/88	6/17/88			STATE		
6	PROJECT NO.	PROJECT NO.			ZIP		
7	3036-U1	3036-U1					
8	DATE	DATE					
9	1/24/88	1/24/88					
10	DATE	DATE					
11	1/24/88	1/24/88					
12	DATE	DATE					
13	1/24/88	1/24/88					
14	DATE	DATE					
15	1/24/88	1/24/88					
16	DATE	DATE					
17	1/24/88	1/24/88					
18	DATE	DATE					
19	1/24/88	1/24/88					
20	DATE	DATE					
21	1/24/88	1/24/88					
22	DATE	DATE					
23	1/24/88	1/24/88					
24	DATE	DATE					
25	1/24/88	1/24/88					
26	DATE	DATE					
27	1/24/88	1/24/88					
28	DATE	DATE					
29	1/24/88	1/24/88					
30	DATE	DATE					
31	1/24/88	1/24/88					
32	DATE	DATE					
33	1/24/88	1/24/88					
34	DATE	DATE					
35	1/24/88	1/24/88					
36	DATE	DATE					
37	1/24/88	1/24/88					
38	DATE	DATE					
39	1/24/88	1/24/88					
40	DATE	DATE					
41	1/24/88	1/24/88					
42	DATE	DATE					
43	1/24/88	1/24/88					
44	DATE	DATE					
45	1/24/88	1/24/88					
46	DATE	DATE					
47	1/24/88	1/24/88					
48	DATE	DATE					
49	1/24/88	1/24/88					
50	DATE	DATE					
51	1/24/88	1/24/88					
52	DATE	DATE					
53	1/24/88	1/24/88					
54	DATE	DATE					
55	1/24/88	1/24/88					
56	DATE	DATE					
57	1/24/88	1/24/88					
58	DATE	DATE					
59	1/24/88	1/24/88					
60	DATE	DATE					
61	1/24/88	1/24/88					
62	DATE	DATE					
63	1/24/88	1/24/88					
64	DATE	DATE					
65	1/24/88	1/24/88					
66	DATE	DATE					
67	1/24/88	1/24/88					
68	DATE	DATE					
69	1/24/88	1/24/88					
70	DATE	DATE					
71	1/24/88	1/24/88					
72	DATE	DATE					
73	1/24/88	1/24/88					
74	DATE	DATE					
75	1/24/88	1/24/88					
76	DATE	DATE					
77	1/24/88	1/24/88					
78	DATE	DATE					
79	1/24/88	1/24/88					
80	DATE	DATE					
81	1/24/88	1/24/88					
82	DATE	DATE					
83	1/24/88	1/24/88					
84	DATE	DATE					
85	1/24/88	1/24/88					
86	DATE	DATE					
87	1/24/88	1/24/88					
88	DATE	DATE					
89	1/24/88	1/24/88					
90	DATE	DATE					
91	1/24/88	1/24/88					
92	DATE	DATE					
93	1/24/88	1/24/88					
94	DATE	DATE					
95	1/24/88	1/24/88					
96	DATE	DATE					
97	1/24/88	1/24/88					
98	DATE	DATE					
99	1/24/88	1/24/88					
100	DATE	DATE					

C-12260-

1

2

3

4

REV	DESCRIPTION OF CHANGE	DATE
NEW	NEW PART RELEASE	5-22-78

GAME NAME	3036	3036	3036
ASSY. NO.			
U23			
U24			
U25			
U26			
U27			
U28			
U29			
U30			
U31			
U32			
U33			
U34			
U35			
U36			
U37			
U38			
U39			
U40			
U41			
U42			
U43			
U44			
U45			
U46			
U47			
U48			
U49			

GAME NAME	3038	3038	3038
ASSY. NO.			
U50			
U51			
U52			
U53			
U54			
U55			
U56			
U57			
U58			
U59			
U60			
U61			
U62			
U63			
U64			
U65			
U66			
U67			
U68			
U69			
U70			
U71			
U72			
U73			
U74			
U75			
U76			

GAME NAME	3036	3036	3036
ASSY. NO.			
U77			
U78			
U79			
U80			
U81			
U82			
U83			
U84			
U85			
U86			
U87			
U88			
U89			
U90			
U91			
U92			
U93			
U94			

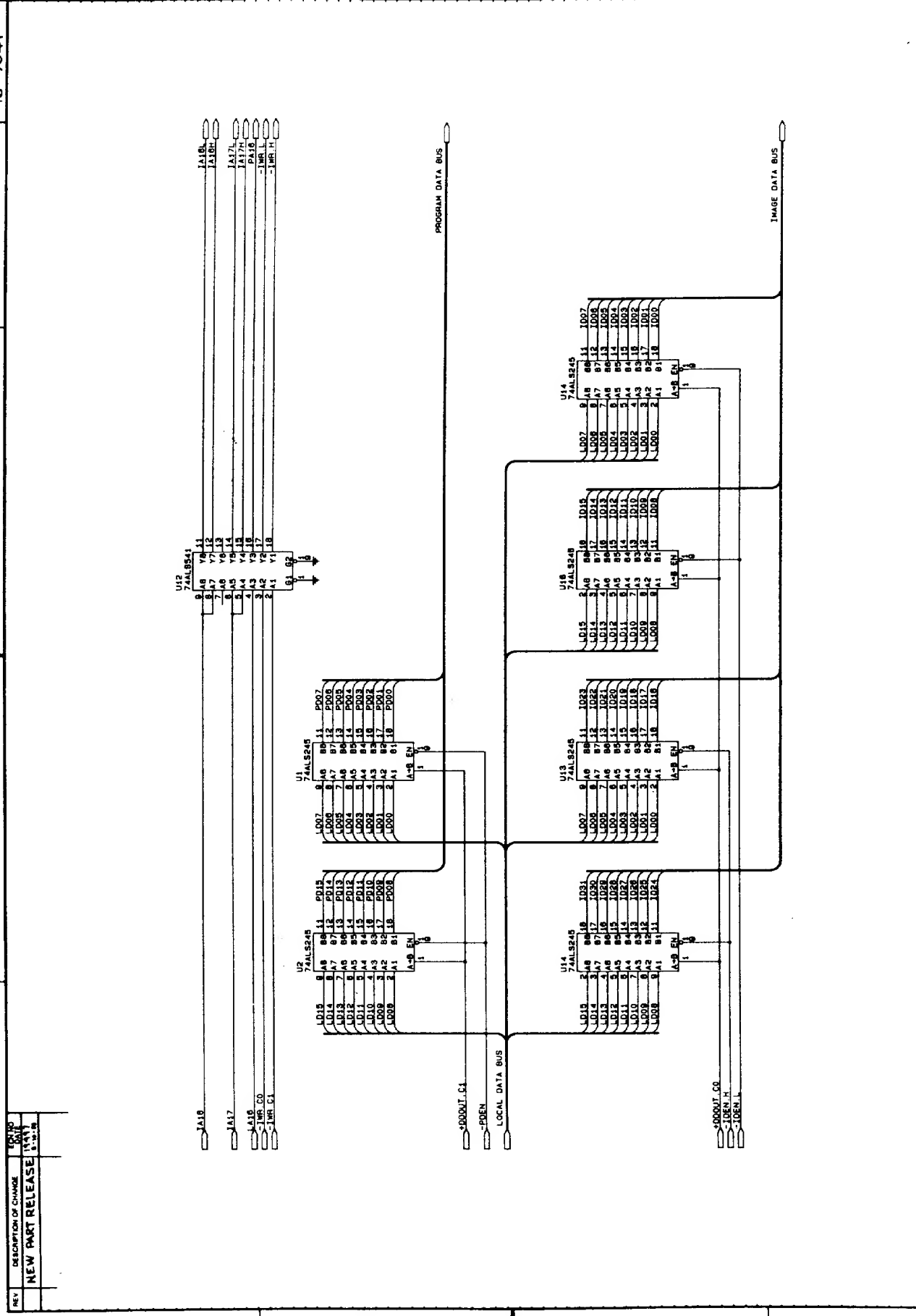
ITEM	PART NO.	PART DESIGNATION	DESCRIPTION	QTY
1	C-12261	SYS-2 ROM 2 SUB-ASSY		1
2	10-8850-219	LABEL, PCB IDENT.		1
3	SEE CHART	SEE CHART	GAME ROM SET	SEE CHART
4				
5				
6				

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 18-90-11

DO NOT SCALE UNLESS OTHERWISE SPECIFIED		DO NOT SCALE UNLESS OTHERWISE SPECIFIED	
DECIMAL	1/32	DECIMAL	1/32
FRACTIONAL	1/32	FRACTIONAL	1/32
MATERIAL		MATERIAL	
NONE		NONE	
SCALE		SCALE	
1"=1.00"		1"=1.00"	
DATE		DATE	
6-24-78		6-24-78	
CHECKED BY		CHECKED BY	
JAL		JAL	
APPROVAL		APPROVAL	
JAN 7/18/78		JAN 7/18/78	
D-1366		D-1366	
QTY		QTY	
1		1	
REV		REV	
C-12260-		C-12260-	

WILLIAMS ELECTRONICS, INC.
3401 N. CALIFORNIA AVE.
CHICAGO, IL 60618

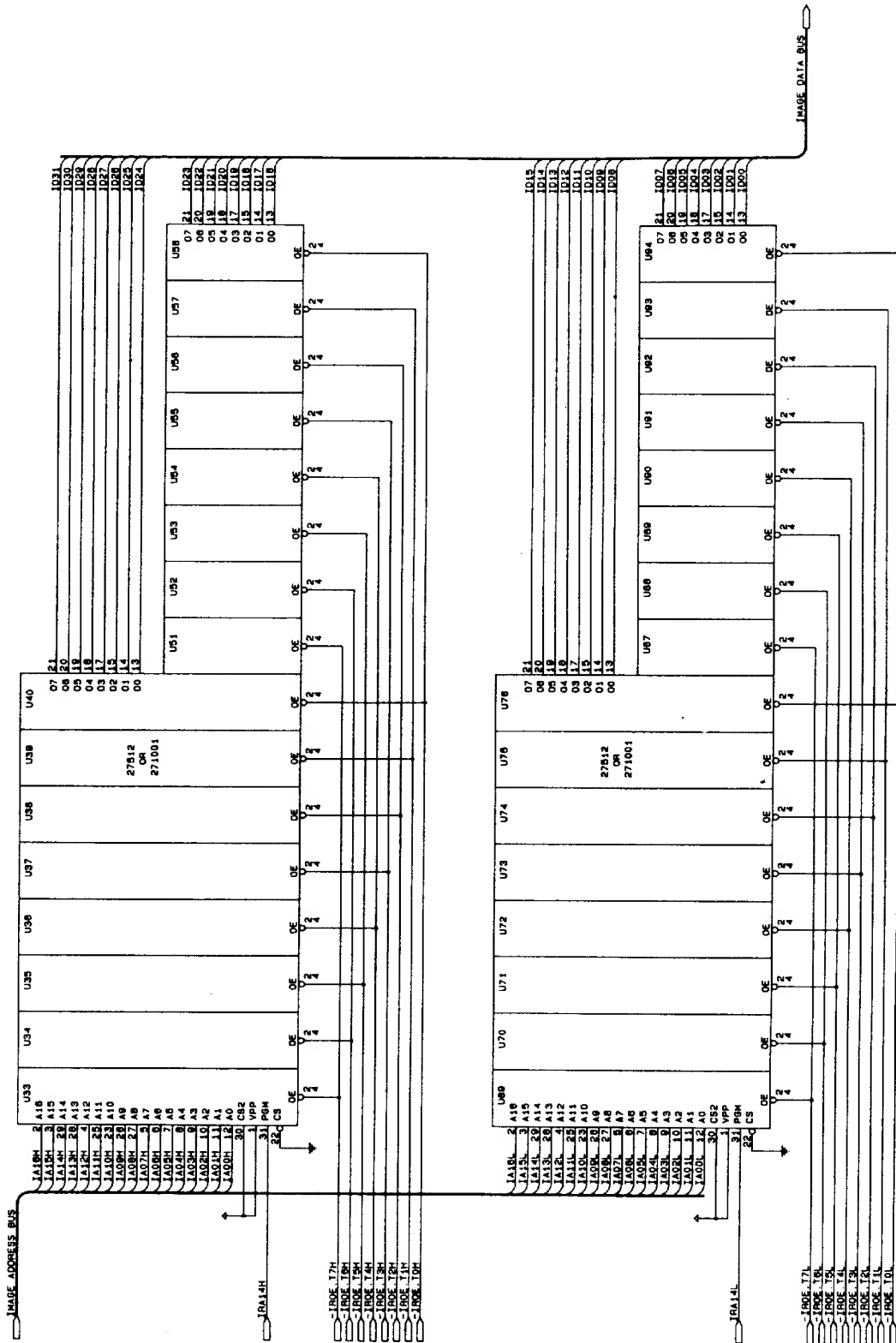
SYS-2 ROM-2 PCB ASSEMBLY



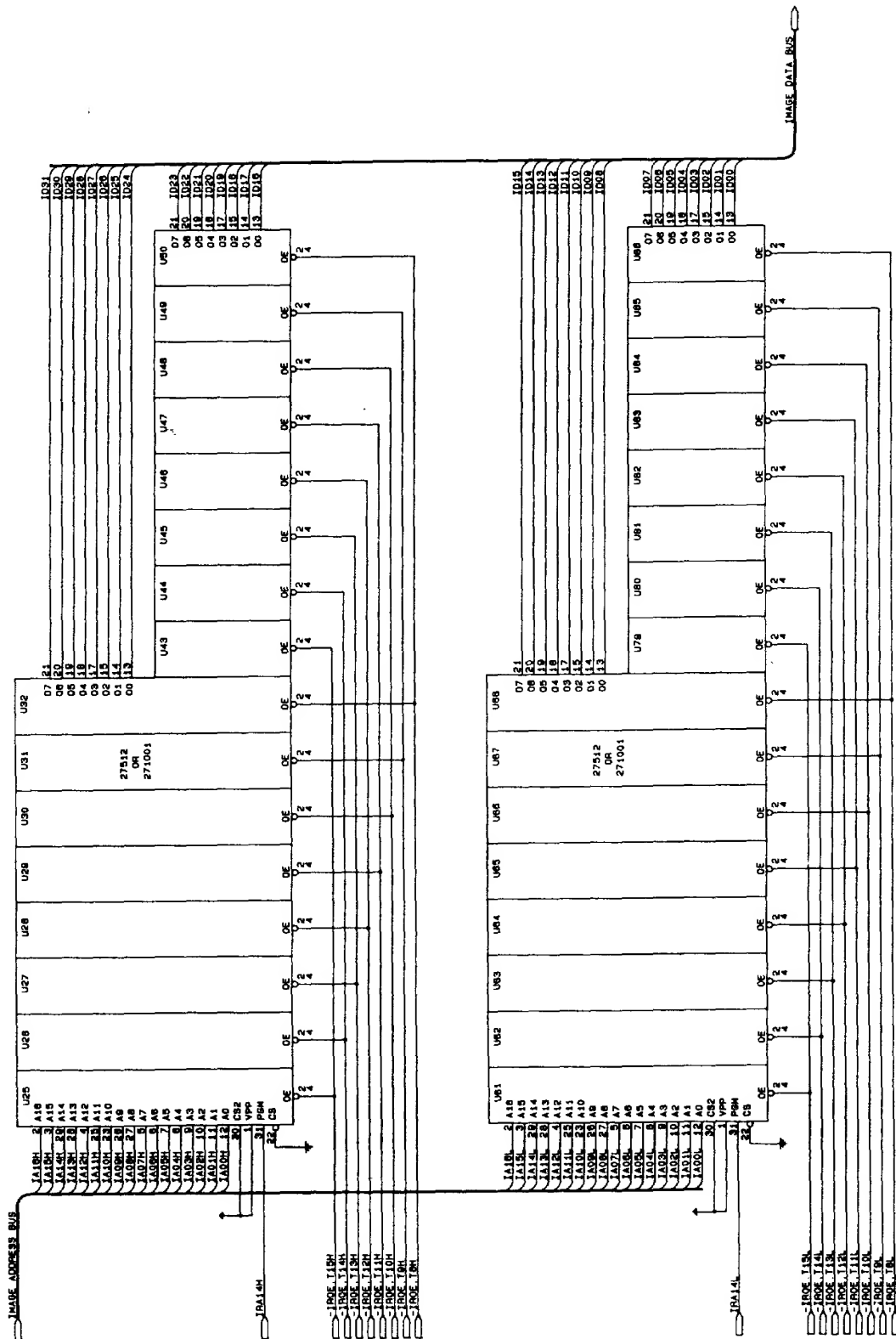
ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ ENGR	DO NOT SCALE	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	
DATE	WORK TO	TOLERANCES	
OWN BY	DIMENSIONS	UNLESS OTHERWISE SPECIFIED	
G. S. G-24-88	SHOWN	DECIMAL - XX 1/100 ANGULAR - 1/16°	
DATE	DATE	FRACTIONAL - XX 1/16	
2/28/88	3086-U1	MATERIAL	
2/28/88	3086-U1	QTY	
2/28/88	3086-U1	PART NO	
2/28/88	3086-U1	SCALE	
2/28/88	3086-U1	16-9041	

WILLIAMS ELECTRONICS, INC.		QTY
340 N. CALIFORNIA AVE.		
CHICAGO, IL 60648		
NAME		
SYS-Z ROM-2 SCHEMATIC		
SCALE	PART NO	
1/16"	16-9041	

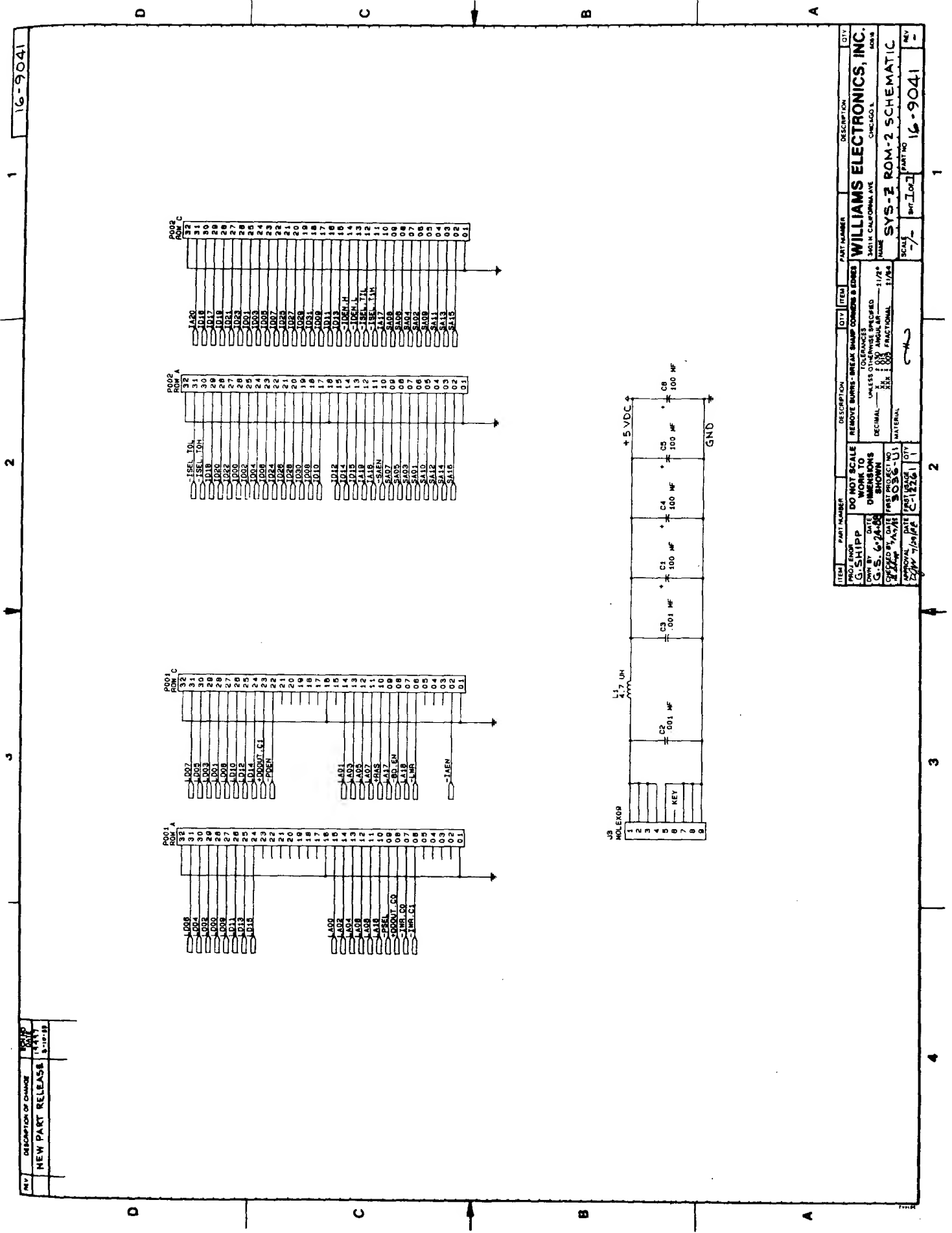
REV	DESCRIPTION OF CHANGE	EXTENSION DATE
	NEW PART RELEASE	1949 8-10-58

[illegible]

REC'D	DESCRIPTION OF CHANGE	ECN NO. DATE
	NEW PART RELEASE	1447 8-18-88

[illegible]

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	3-10-68



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	WILLIAMS	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	1	1	WILLIAMS	REMOVE BURRS - BREAK SHARP CORNERS & EDGES	1
2	DO NOT SCALE	DO NOT SCALE	1	2	DO NOT SCALE	DO NOT SCALE	1
3	WILLIAMS	WILLIAMS	1	3	WILLIAMS	WILLIAMS	1
4	WILLIAMS	WILLIAMS	1	4	WILLIAMS	WILLIAMS	1
5	WILLIAMS	WILLIAMS	1	5	WILLIAMS	WILLIAMS	1
6	WILLIAMS	WILLIAMS	1	6	WILLIAMS	WILLIAMS	1
7	WILLIAMS	WILLIAMS	1	7	WILLIAMS	WILLIAMS	1
8	WILLIAMS	WILLIAMS	1	8	WILLIAMS	WILLIAMS	1
9	WILLIAMS	WILLIAMS	1	9	WILLIAMS	WILLIAMS	1

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	3-10-68

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	3-10-68

REV	DESCRIPTION OF CHANGE	DATE
1	NEW PART RELEASE	12-28-86

3J2 Functions

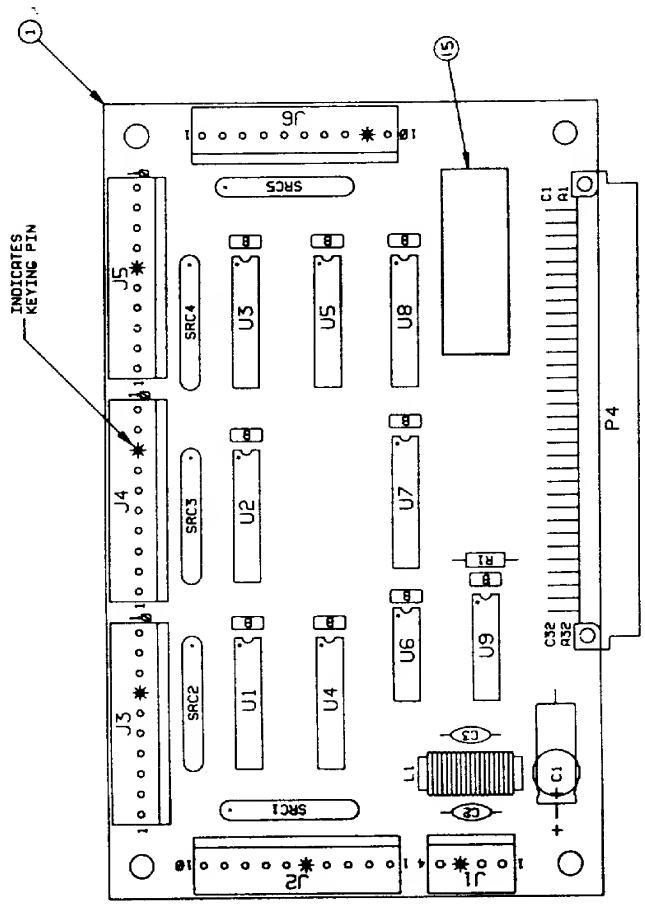
- Pin/Function
- 1 - NC
 - 2 - NC
 - 3 - NC
 - 4 - NC
 - 5 - Key
 - 6 - Memory Protect
 - 7 - T/B Strobe
 - 8 - Player 2 Start
 - 9 - Player 1 Start

3J4 Functions

- Pin/Function
- 1 - Player 1 Rocket
 - 2 - Player 1 Jump
 - 3 - Player 1 Fire
 - 4 - Player 1 Crouch
 - 5 - Player 1 Right
 - 6 - Player 1 Left
 - 7 - Player 1 Down
 - 8 - Key
 - 9 - Player 1 Up
 - 10 - Ground

3J3 Functions

- Pin/Function
- 1 - Player 2 Rocket
 - 2 - Player 2 Jump
 - 3 - Player 2 Fire
 - 4 - Player 2 Crouch
 - 5 - Player 2 Right
 - 6 - Player 2 Left
 - 7 - Key
 - 8 - Player 2 Down
 - 9 - Player 2 Up
 - 10 - Ground



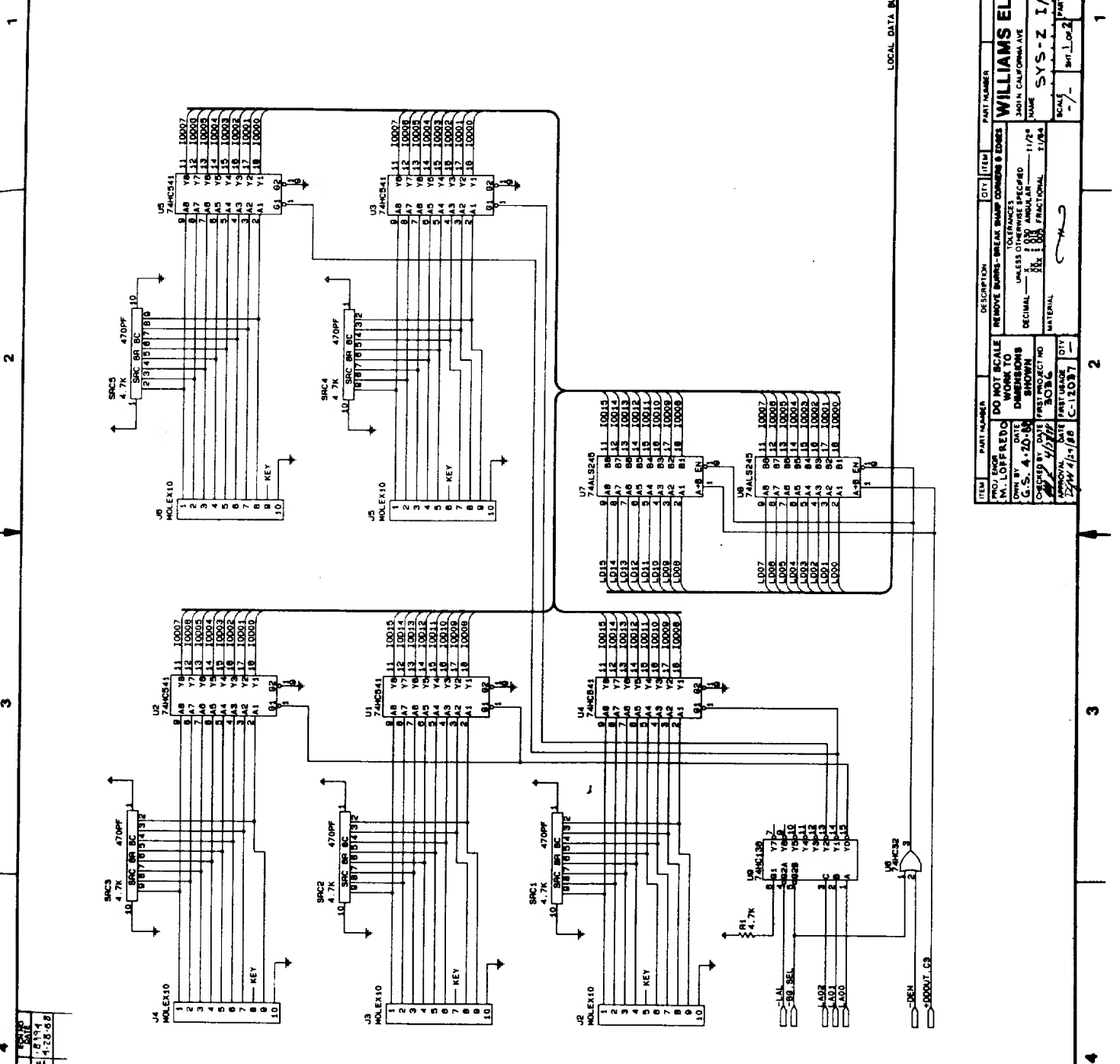
ITEM	PART NO.	PART DESCRIPTION	QTY
15	16-8850	LABEL, PCB IDENT.	1
14	5792-	CONNECTOR, 64P EURO-DIN CARO CONN. FEMALE	1
13	5791-	CONNECTOR, 10P MOLEX, .156" CENTER PINS	5
12	5791-	CONNECTOR, 4P MOLEX, .156" CENTER PINS	1
11	5043-	CAPACITOR, .001 MFD.	2
10	5040-	CAPACITOR, 100 MFD.	1
9	5043-	CAPACITOR, 0.01 MFD.	9
8	5010-	RESISTOR, 4.7K, 1/4W, 5%	1
7	5050-	SCR1, SCR2, SCR3, SIP, 10P 8-RES/8-CAP NETWORK, 4.7K, 470 PF	5
6	5551-	INDUCTOR, 4.7 UH	1
5	5311-	74HC138, H-CMOS 3/8 DECODER	1
4	5317-	74ALS245, ALS TTL OCTAL BUS TRANSCEIVER	2
3	5311-	74HC32, H-CMOS QUAD 2-INPUT OR GATE	1
2	5311-	74HC541, HC TTL OCTAL BUFFER	5
1	5779-	BARE PC BOARD	1

BILL OF MATERIALS

DO NOT SCALE WORK TO DIMENSIONS SHOWN		REMOVE BURRS-BREAK SHARP CORNERS & EDGES	
DATE 2/12/88	DATE 4/29/88	TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL .001 ANGULAR 1/2°	
CHANGED BY JW	DATE 2/12/88	SCALE 1.5/1	
PART NO. C-12037		REV. 1	
MATERIAL NONE		SYN-Z I/O PCB ASSEMBLY	
WILLIAMS ELECTRONICS, INC. 3401N CALIFORNIA AVE CHICAGO, IL 60630		C-12037	

NOTE: FOR SCHEMATIC, REFER TO DRAWING NO. 16-9028.

16-9028



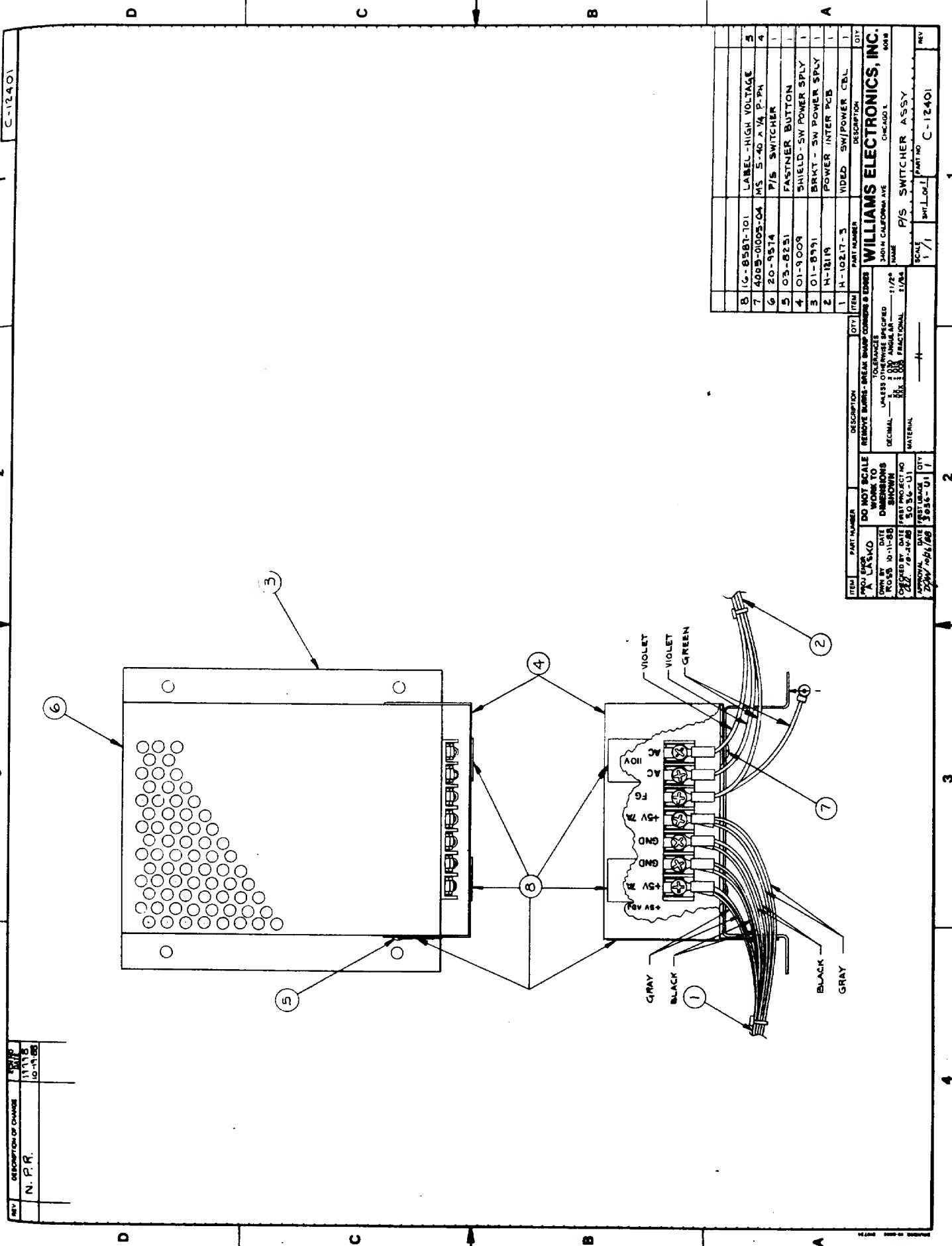
REV	DESCRIPTION OF CHANGE	DATE	BY
1	NEW PART RELEASE	1-10-88	16-9028

ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
1	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	1	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1
2	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	2	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1
3	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	3	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1
4	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1	4	74ALS245	DO NOT SCALE WORK TO DIMENSIONS SHOWN	1

PROJ. NO.	WILLIAMS ELECTRONICS, INC.	DESCRIPTION	16-9028
DATE	1-10-88	NAME	16-9028
BY	1-10-88	DATE	1-10-88
CHKD BY	1-10-88	DATE	1-10-88
APP'D BY	1-10-88	DATE	1-10-88

SCALE	1/2"	FRACTIONAL	1/2"
SCALE	1/2"	FRACTIONAL	1/2"
SCALE	1/2"	FRACTIONAL	1/2"
SCALE	1/2"	FRACTIONAL	1/2"

REV	DESCRIPTION OF CHANGE	DATE
1	N. P. R.	11/1/8
2		10-15-88



ITEM	PART NUMBER	DESCRIPTION	QTY
1	H-10217-3	VIDEO SW/POWER CBL	1
2	H-12119	POWER INTER PCB	1
3	O1-8791	BRKT - SW POWER SPLY	1
4	O1-9009	SHIELD-SW POWER SPLY	1
5	O3-8231	FASTNER BUTTON	1
6	20-9574	P/S SWITCHER	1
7	4005-01003-04	M/S 5-40 A/VA P-PH	4
8	16-8581-101	LABEL-HIGH VOLTAGE	5

WILLIAMS ELECTRONICS, INC. 34014 CALIFORNIA AVE CHICAGO, IL 60640	
NAME P/S SWITCHER ASSY	SCALE 1/1
PART NO C-12401	REV 1
TOLERANCES UNLESS OTHERWISE SPECIFIED DECIMAL - .005 FRACTIONAL - 1/16	
MATERIAL H-10217-3	
DO NOT SCALE WORK TO DIMENSIONS SHOWN	
DATE 10-11-88	DATE 10-11-88
APPROVAL 2/24/88	APPROVAL 2/24/88

C-12350

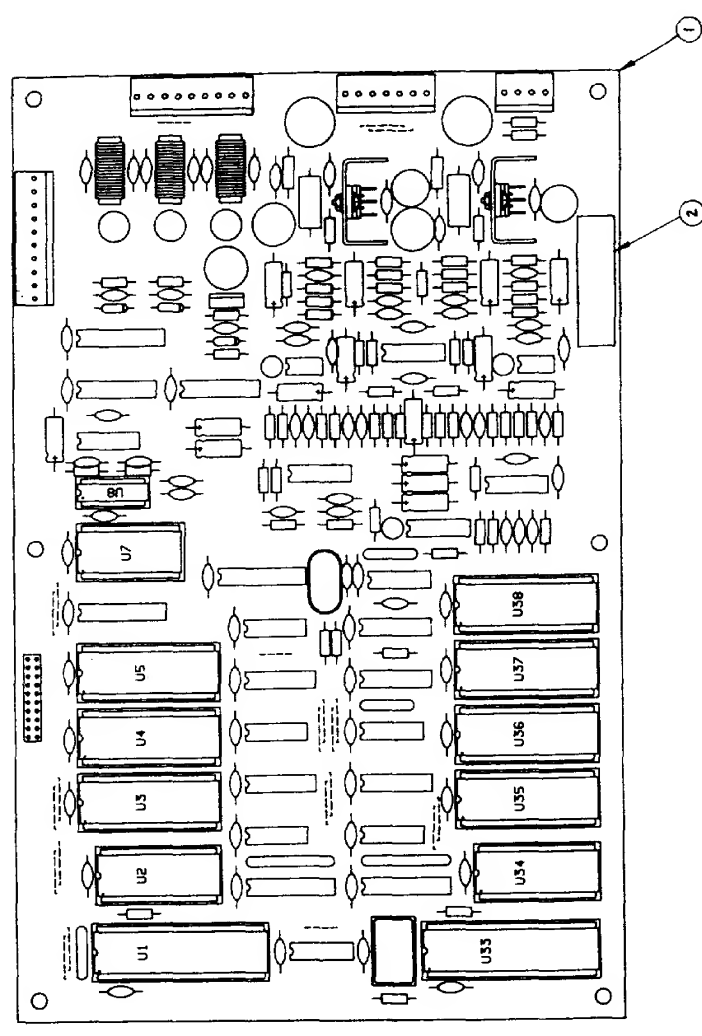
1

2

3

4

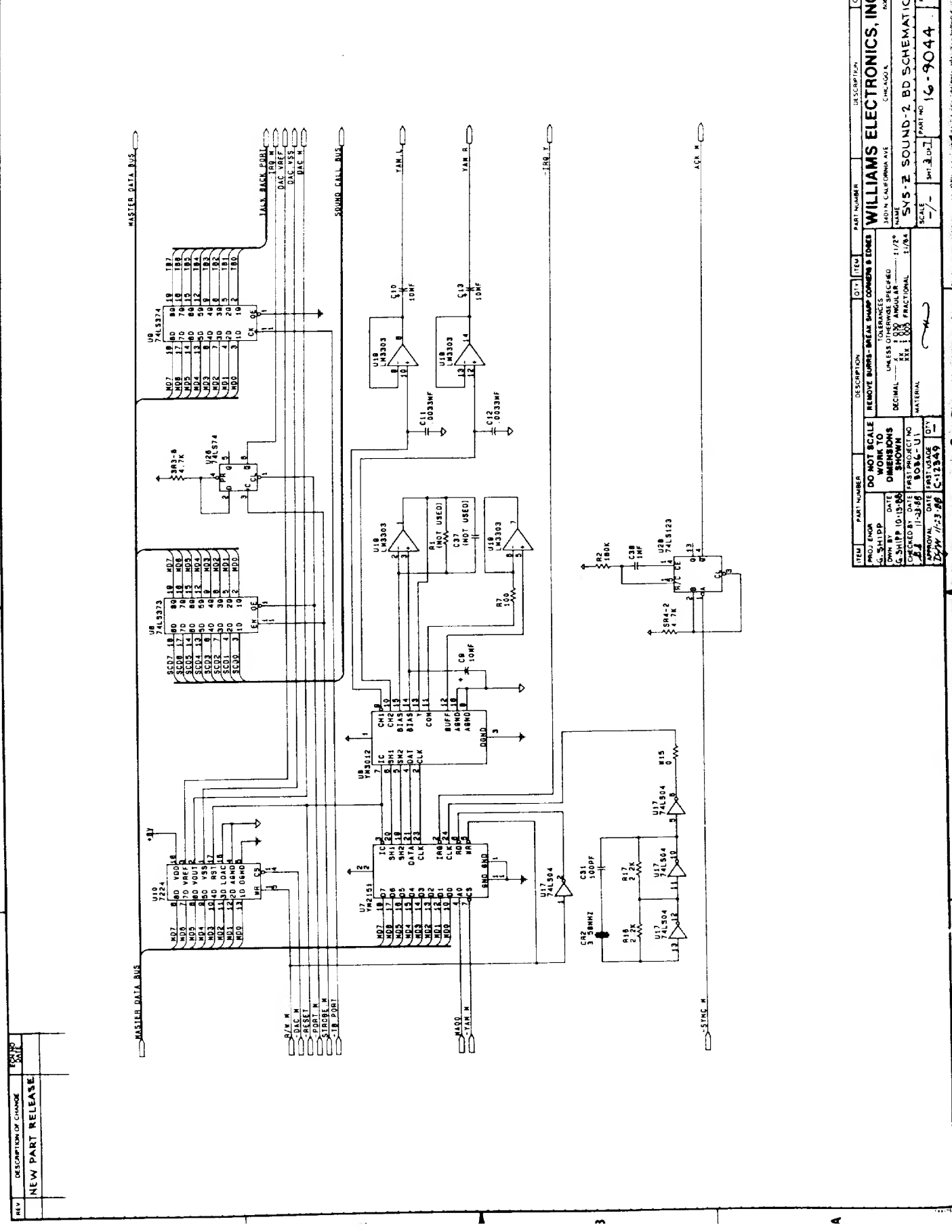
REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	



NOTE:
FOR SCHEMATIC, REFER TO DRAWING NO. 16-9044.

ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT	PART NUMBER	DESCRIPTION	QTY
PROJ ENG	DO NOT SCALE	REMOVE BURRS-BREAK BUMP CORNERS & EDGES					
ALL LOF FES	WORK TO DIMENSIONS	UNLESS OTHERWISE SPECIFIED					
DATE	9-22-68	DECIMAL	1/16	ANGULAR	1/2°		
CHECKED BY	DATE	FIRST PROJECT NO	3036-U1	FRACTIONAL	1/8		
11-30-68							
APPROVAL	DATE	FIRST USAGE	QTY				
11-30-68		0-12266	1				

WILLIAMS ELECTRONICS, INC.	
2401 N. CALIFORNIA AVE.	
CHICAGO, ILL. 60640	
NAME	SYS-2 SOUND-2 ASSEMBLY
SCALE	1/1
PART NO	C-12350
REV	1



ITEM	PART NUMBER	DESCRIPTION	QTY	REV
1	16-9044	WILLIAMS ELECTRONICS, INC.		
2	16-9044	NAME		
3	16-9044	DATE		
4	16-9044	TIME		
5	16-9044	SCALE		
6	16-9044	SCALE		
7	16-9044	SCALE		
8	16-9044	SCALE		
9	16-9044	SCALE		
10	16-9044	SCALE		
11	16-9044	SCALE		
12	16-9044	SCALE		
13	16-9044	SCALE		
14	16-9044	SCALE		
15	16-9044	SCALE		
16	16-9044	SCALE		
17	16-9044	SCALE		
18	16-9044	SCALE		
19	16-9044	SCALE		
20	16-9044	SCALE		
21	16-9044	SCALE		
22	16-9044	SCALE		
23	16-9044	SCALE		
24	16-9044	SCALE		
25	16-9044	SCALE		
26	16-9044	SCALE		
27	16-9044	SCALE		
28	16-9044	SCALE		
29	16-9044	SCALE		
30	16-9044	SCALE		
31	16-9044	SCALE		
32	16-9044	SCALE		
33	16-9044	SCALE		
34	16-9044	SCALE		
35	16-9044	SCALE		
36	16-9044	SCALE		
37	16-9044	SCALE		
38	16-9044	SCALE		
39	16-9044	SCALE		
40	16-9044	SCALE		
41	16-9044	SCALE		
42	16-9044	SCALE		
43	16-9044	SCALE		
44	16-9044	SCALE		
45	16-9044	SCALE		
46	16-9044	SCALE		
47	16-9044	SCALE		
48	16-9044	SCALE		
49	16-9044	SCALE		
50	16-9044	SCALE		
51	16-9044	SCALE		
52	16-9044	SCALE		
53	16-9044	SCALE		
54	16-9044	SCALE		
55	16-9044	SCALE		
56	16-9044	SCALE		
57	16-9044	SCALE		
58	16-9044	SCALE		
59	16-9044	SCALE		
60	16-9044	SCALE		
61	16-9044	SCALE		
62	16-9044	SCALE		
63	16-9044	SCALE		
64	16-9044	SCALE		
65	16-9044	SCALE		
66	16-9044	SCALE		
67	16-9044	SCALE		
68	16-9044	SCALE		
69	16-9044	SCALE		
70	16-9044	SCALE		
71	16-9044	SCALE		
72	16-9044	SCALE		
73	16-9044	SCALE		
74	16-9044	SCALE		
75	16-9044	SCALE		
76	16-9044	SCALE		
77	16-9044	SCALE		
78	16-9044	SCALE		
79	16-9044	SCALE		
80	16-9044	SCALE		
81	16-9044	SCALE		
82	16-9044	SCALE		
83	16-9044	SCALE		
84	16-9044	SCALE		
85	16-9044	SCALE		
86	16-9044	SCALE		
87	16-9044	SCALE		
88	16-9044	SCALE		
89	16-9044	SCALE		
90	16-9044	SCALE		
91	16-9044	SCALE		
92	16-9044	SCALE		
93	16-9044	SCALE		
94	16-9044	SCALE		
95	16-9044	SCALE		
96	16-9044	SCALE		
97	16-9044	SCALE		
98	16-9044	SCALE		
99	16-9044	SCALE		
100	16-9044	SCALE		

16-9044

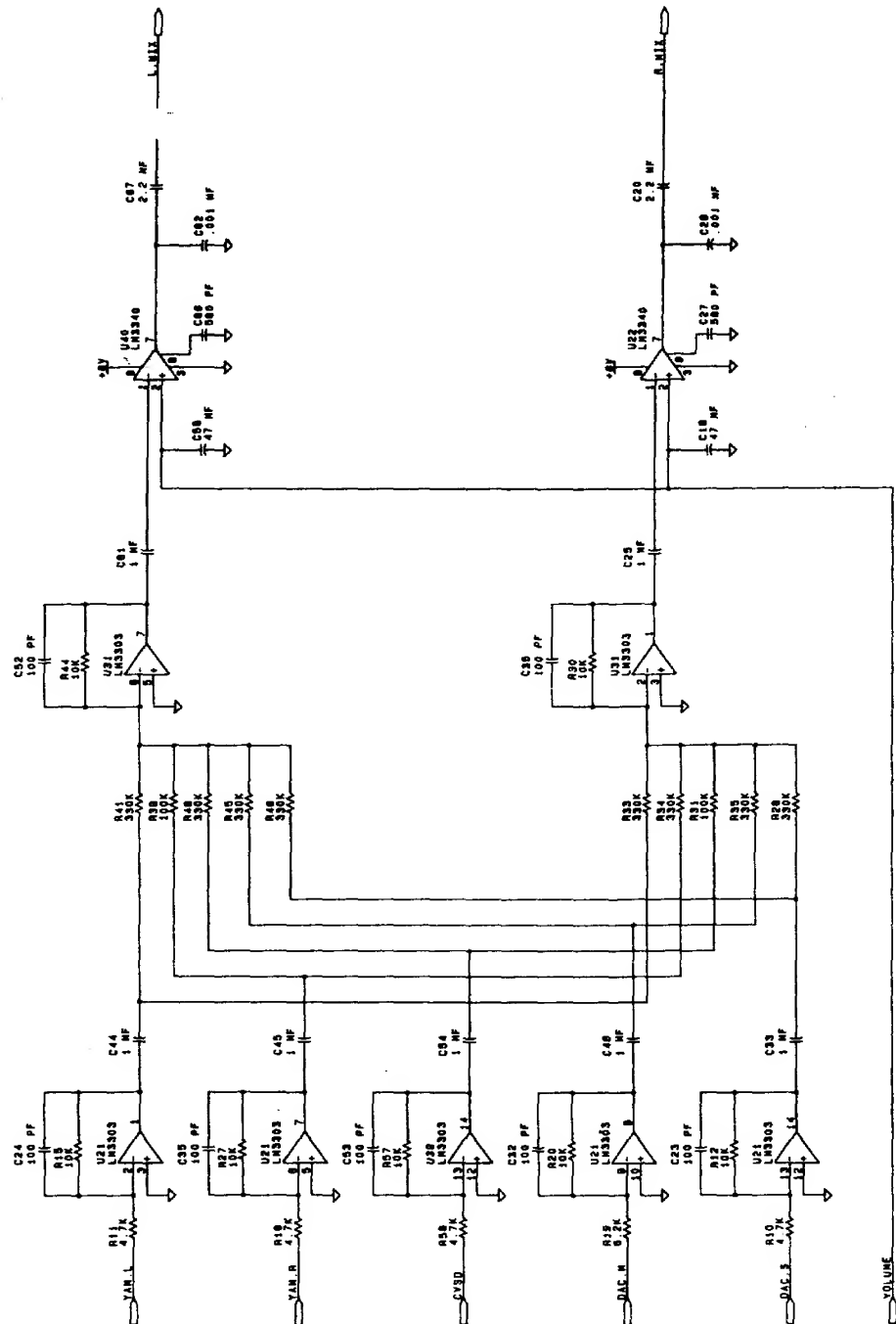
1

2

3

4

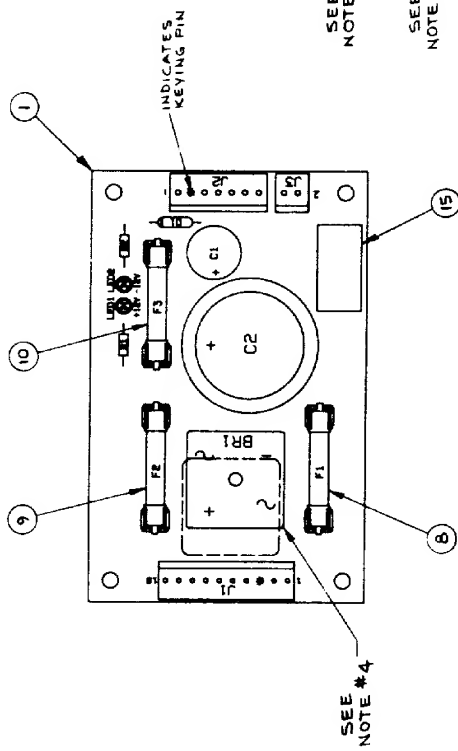
REV	DESCRIPTION OF CHANGE	DATE
NEW PART RELEASE		



ITEM	PART NUMBER	DESCRIPTION	QTY	ITEM	PART NUMBER	DESCRIPTION	QTY
PROJ. ENGR		REMOVE BURR - BREAK SWAP CORNERS & EDGES		PROJ. ENGR		WILLIAMS ELECTRONICS, INC.	
DATE		TOLERANCES		DATE		3401 N. CALIFORNIA AVE	
10-12-80		UNLESS OTHERWISE SPECIFIED		10-12-80		CHICAGO, IL	
11-21-80		DECIMAL	11/100	11-21-80		NAME	SYN-E SOUND-2 BD. SCHEMATIC
11-22-80		FRACTIONAL	1/100	11-22-80		SCALE	1/16"
11-22-80		MATERIAL	80/20-UL	11-22-80		PART NO.	16-9044
11-22-80		QTY	1	11-22-80		REV.	-

REV	DESCRIPTION OF CHANGE	DATE	BY
1	NEW PART RELEASE	5/18/88	WLB

C-1221B



NOTE: 1. FOR SCHEMATIC, REFER TO DRAWING NO. 18-9837.
 2. ALL FUSES TO BE INSTALLED AFTER SOLDER WASH.
 3. EACH FUSEHOLDER CAN BE SUBSTITUTED WITH
 2 FUSE CLIPS PT. NO. 5732-0917B-00.
 4. BR1 MUST BE MOUNTED 1/8"
 ABOVE SURFACE OF PCB.

ITEM	PART NO.	PART DESCRIPTION	DESCRIPTION	QTY.
15	16-BB50-216		LABEL, PCB IDENT.	1
14	5791-10862-10	J1	CONN., 10-PIN MOLEX, .156" CENTER PINS	1
13	5791-10862-07	J2	CONN., 7-PIN MOLEX, .156" CENTER PINS	1
12	5791-10862-02	J3	CONN., 2-PIN MOLEX, .156" CENTER PINS	1
11	5733-12060-01	F1, F2, F3	FUSEHOLDER	3
10	5730-09197-00	F3	FUSE, 0.75A, 250V	1
9	5731-09432-00	F2	FUSE, 7A 5B, 250V	1
8	5731-10356-00	F1	FUSE, 3A 5B, 250V	1
7	5040-12315-00	C2	CAPACITOR, ELECT., RAD., 1500 MFD. 25V.	1
6	5040-12314-00	C1	CAPACITOR, ELECT., RAD., 2200 MFD. 25V.	1
5	5671-09019-00	LED1, LED2	LIGHT EMITTING DIODE, RED	2
4	5100-09418-00	BR1	BRIDGE RECTIFIER, 55V.	1
3	5070-06258-00	D1	DIODE, 1N4001	1
2	5010-09514-00	R1, R2	RESISTOR, C.F., 1.2K 5% 1/4 WATT	2
1	5773-12389-00		BARE PC BOARD	1

BILL OF MATERIALS

DO NOT SCALE		REMOVE BURST-BREAK FROM COORDINATE		WILLIAMS ELECTRONICS, INC.	
DATE	BY	DATE	BY	DATE	BY
5/18/88	WLB	5/18/88	WLB	5/18/88	WLB
CHECKED BY		CHECKED BY		CHECKED BY	
WLB		WLB		WLB	
APPROVAL		APPROVAL		APPROVAL	
WLB		WLB		WLB	
DATE		DATE		DATE	
5/18/88		5/18/88		5/18/88	
QTY.		QTY.		QTY.	
1		1		1	
C-1221B		C-1221B		C-1221B	
REV.		REV.		REV.	
1		1		1	

16-9037

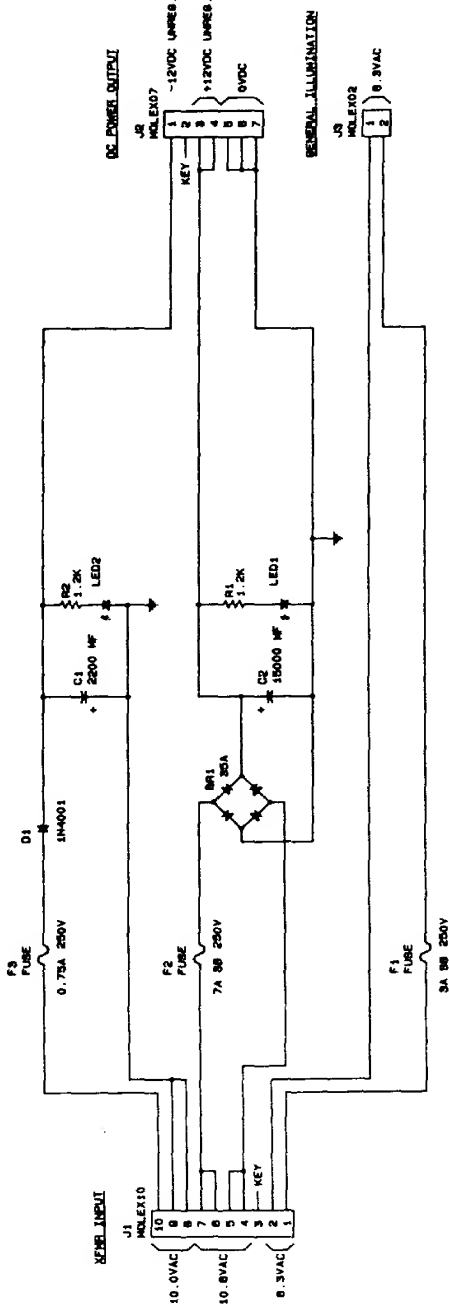
1

2

3

4

REV	DESCRIPTION OF CHANGE	DATE
	NEW PART RELEASE	1-18-68



ITEM	PART NUMBER	DESCRIPTION	QTY	UNIT
1	16-9037	REMOTE BURN-IN TESTER	1	PCB
WILLIAMS ELECTRONICS, INC.				
3401 N. CALIFORNIA AVE.				
CHICAGO, ILL.				
NAME: 12 UNREG P/S BD., SCHEMATIC				
SCALE: 1/8"				
PART NO: 16-9037				
REV: 1				
DATE: 1-18-68				
BY: J. W. 5/17/68				
C-12218				
DO NOT SCALE				
DIMENSIONS SHOWN				
UNLESS OTHERWISE SPECIFIED				
DECIMAL: 1/16" ANGULAR: 1/2°				
FRACTIONAL: 1/8"				
MATERIAL: 1/8"				